PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-169511

(43)Date of publication of application : 14.06.2002

(51)Int.Cl. G09G 3/30
G09F 9/30
G09G 3/20
H05B 33/08
H05B 33/14

(21)Application number : 2001-278722

(22)Date of filing : 13.09.2001

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(30)Priority

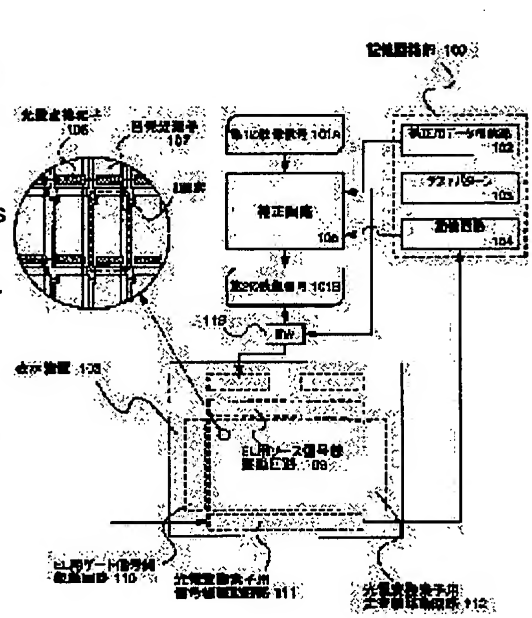
Priority number : 2000283584 Priority date : 19.09.2000 Priority country : JP

(54) LUMINOUS DEVICE AND DRIVING METHOD THEREFOR

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a luminous device which has a function of correcting an decrease in luminance of luminous elements in a pixel part and is able to display a uniform screen without uneven luminance.

SOLUTION: When a power source is switched on, the luminous device displays a specific test pattern, and detects the luminance by a photoelectric transducing element 106 arranged on each pixel and stores it in a storage circuit 104. Following it, a correction circuit 195 corrects a 1st video signal 101A according to the deficiency from the standard luminance (luminance of a normal luminous element at the same gradation stored beforehand), and obtains a 2nd video signal 101B. A display 108 displays a video using the 2nd video signal 101B.



LEGAL STATUS

[Date of request for examination] 01.11.2004

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than

the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

CLAIMS

[Claim(s)]
[Claim 1] Spontaneous light equipment characterized by to have a means to detect the brightness of the spontaneous light corpuscle child of each pixel, a means memorize said brightness, and a means amend said video signal according to said memorized brightness, in the spontaneous light equipment which inputs a video signal and displays an image, and to display an image using said amended video signal.
[Claim 2] The optoelectric transducer which detects the brightness of the spontaneous light corpuscle child of each pixel in the spontaneous light equipment which inputs a video signal and displays an image, The store circuit which memorizes the brightness of the spontaneous light corpuscle child of each of said pixel detected by said optoelectric transducer, Spontaneous light equipment characterized by having the brightness compensator which has the signal amendment section which amends the 1st video signal according to the brightness of the spontaneous light corpuscle child of each of said memorized pixel, and outputs the 2nd video signal, and the display which displays an image with said 2nd video signal.
[Claim 3] The optoelectric transducer of the jxk individual (j and k are the natural number) which detects the brightness of the spontaneous light corpuscle child of each pixel in the spontaneous light equipment which inputs a video signal and displays an image, The storage which memorizes the brightness of the spontaneous light corpuscle child of each of said pixel detected by said optoelectric transducer, The signal amendment section which amends the 1st video signal according to the brightness of the spontaneous light corpuscle child of each of said memorized pixel, and outputs the 2nd video signal, Spontaneous light equipment characterized by having the brightness compensator which ****, and the display which has the jxk pixel which displays an image with said 2nd video signal.
[Claim 4] The spontaneous light equipment which displays n bit (n is natural number and n>=2) gradation on any 1 term of claim 1 thru/or claim 3 in the spontaneous light equipment of a publication The pixel which has the drive circuit which performs signal processing of a n+m bit (m is the natural number), and has the spontaneous light corpuscle child who has not produced the fall of brightness To the pixel which has the spontaneous light corpuscle child who displayed gradation and produced the fall of brightness with the n-bit video signal Spontaneous light equipment which is between the spontaneous light corpuscle child who has not produced the fall of said brightness by amending a video signal using a m-bit signal to the n-bit video signal, and the spontaneous light corpuscle child who produced the fall of said brightness, and is characterized by obtaining equal brightness.
[Claim 5] It is spontaneous light equipment characterized by to carry out addition processing to the video signal written in the pixel which has the spontaneous light corpuscle child from whom said amendment means produced the fall of brightness in spontaneous light equipment given in any 1 term of claim 1 thru/or claim 3 relatively to the video signal written in the pixel which has the spontaneous light corpuscle child who has not produced the fall of brightness.
[Claim 6] In spontaneous light equipment given in any 1 term of claim 1 thru/or claim 3 said amendment means To the video signal written in the pixel which has the spontaneous light corpuscle child who has not produced the fall of the pixel or brightness which has the small spontaneous light

corpuscle child of a fall of brightness in a display rectangle Spontaneous light equipment characterized by performing subtraction processing relatively to the video signal written in the pixel which has a spontaneous light corpuscle child with the largest fall of brightness.
[Claim 7] It is spontaneous light equipment characterized by said storage means using a static mold store circuit (SRAM) in spontaneous light equipment given in any 1 term of claim 1 thru/or claim 6.
[Claim 8] It is spontaneous light equipment characterized by said storage means using a dynamic mold store circuit (DRAM) in spontaneous light equipment given in any 1 term of claim 1 thru/or claim 6.
[Claim 9] It is spontaneous light equipment characterized by said storage means using a ferroelectric store circuit (FeRAM) in spontaneous light equipment given in any 1 term of claim 1 thru/or claim 6.
[Claim 10] It is spontaneous light equipment characterized by writing in said storage means electrically in spontaneous light equipment given in any 1 term of claim 1 thru/or claim 6, and using the nonvolatile memory (EEPROM) in which read-out and elimination are possible.
[Claim 11] Spontaneous light equipment characterized by using PN mold photodiode at said optoelectric transducer as said brightness detection means in spontaneous light equipment given in any 1 term of claim 1 thru/or claim 10.
[Claim 12] Spontaneous light equipment characterized by using an PIN mold photodiode at said optoelectric transducer as said brightness detection means in spontaneous light equipment given in any 1 term of claim 1 thru/or claim 10.
[Claim 13] Spontaneous light equipment characterized by using an avalanche mold photodiode at said optoelectric transducer as said brightness detection means in spontaneous light equipment given in any 1 term of claim 1 thru/or claim 10.
[Claim 14]

TECHNICAL FIELD

[Field of the Invention] This invention relates to spontaneous light equipment, especially active-matrix mold spontaneous light equipment. It is related with the active-matrix mold spontaneous light equipment which used spontaneous light corpuscle children including an organic electroluminescence (EL) component for the pixel section especially in it.

[Translation done.]

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to spontaneous light equipment, especially active-matrix mold spontaneous light equipment. It is related with the active-matrix mold spontaneous light equipment which used spontaneous light corpuscle children including an organic electroluminescence (EL) component for the pixel section especially in it.
[0002]
[Description of the Prior Art] In recent years, the spread of the spontaneous light equipment in which the semi-conductor thin film was formed on insulators, such as a glass substrate, especially the active-matrix mold spontaneous light equipment using a thin film transistor (it is described as Following TFT) is remarkable. The active-matrix mold spontaneous light equipment which used TFT has millions of [hundreds of thousands to] TFT(s) in the pixel section arranged in the shape of a matrix, and shows the image by controlling the charge of each pixel.
[0003] Furthermore, as latest technique, the technique about the poly-Si TFT which uses TFT and carries out coincidence formation of the drive circuit on the outskirts of the pixel section other than the pixel TFT which constitutes a pixel is developed, it greatly contributes to the miniaturization of equipment, and low-power-ization, and spontaneous light equipment is becoming an indispensable device in connection with it in recent years at the display of mobile computing devices with a remarkable expansion of the applicable field etc.
[0004] Moreover, the spontaneous light equipment adapting spontaneous light ingredients, such as organic electroluminescence, attracts attention as a flat display replaced with LCD (liquid crystal display), and active research is done.
[0005] The outline of usual spontaneous light equipment is shown in drawing 15 (A). It explains in this specification, using an organic EL device (it only being henceforth described as an EL element) as a spontaneous light corpuscle child's example. The pixel section 1504 is arranged in the center of the substrate 1501 of insulators (for example, glass etc.). In addition to the source signal line and the gate signal line, the current supply source line 1505 for supplying a current to an EL element is arranged at the pixel section 1504. The gate signal line drive circuit 1503 for the source signal-line drive circuit 1502 for controlling a source signal line to control a gate signal line for right and left of the pixel section 1504 is arranged at the pixel section 1504 bottom. In addition, in drawing 15 (A), although the gate signal line drive circuit 1503 is arranged at the right-and-left both sides of the pixel section, it may arrange this only in one side. However, it sees and is desirable from the field of drive effectiveness and dependability by considering as both-sides arrangement. The input of the signal to the source signal-line drive circuit 1502 and the gate signal line drive circuit 1503 is performed through a flexible printed circuit board (Flexible Print Circuit:FPC) 1506 from the exterior.
[0006] The enlarged drawing of the part surrounded by the dotted-line frame 1500 is shown in drawing 15 (B) in drawing 15 (A). As the pixel section is shown in this drawing, each pixel is arranged in the shape of a matrix. Among drawing 15 (B), the part further surrounded by the dotted-line frame 1510 is 1

pixel, and it has the source signal line 1511, the gate signal line 1512, the current supply source line 1513, TFT1514 for switching, TFT1515 for EL drive, retention volume 1516, and EL element 1517 grade.
[0007] Next, with reference to this drawing 15 (B), actuation of active-matrix mold spontaneous light equipment is explained. First, if the gate signal line 1512 is chosen, an electrical potential difference will be impressed to the gate electrode of TFT1514 for switching, and TFT1514 for switching will be in switch-on. Then, the signal (voltage signal) of the source signal line 1511 is accumulated in retention volume 1516 as a charge. With the charge accumulated in retention volume 1516, the electrical potential difference VGS between the gate sources of TFT1515 for EL drive is determined, and the current according to the electrical potential difference of retention volume 1516 flows to TFT1515 for EL drive, and EL element 1517. Consequently, EL element 1517 emits light.
[0008] The brightness of currents of EL element 1517, i.e., the amount which flows EL element 1517, is equal to the flowing amount of currents, and it can control between the source drains of TFT1515 for EL drive by VGS of TFT1515 for EL drive. VGS is the electrical potential difference of retention volume 1516, and it is a signal (electrical potential difference) inputted into the source signal line 1511. That is, the brightness of EL element 1517 is controlled by controlling the signal (electrical potential difference) inputted into the source signal line 1511. Finally, the gate signal line 1512 is changed into the condition of not choosing, the gate of TFT1514 for switching is closed, and TFT1514 for switching is made into non-switch-on. The charge accumulated in retention volume 1516 is then held. Therefore, VGS of TFT1515 for EL drive is held as it is, and the current according to VGS continues flowing to EL element 1517 via TFT1515 for EL drive.
[0009] It is related with the drive of an EL element etc. and is SID99 Digest. : P372 : "Current Status and future of Light-Emitting Polymer Display Driven by Poly-Si TFT", ASIA DISPLAY98 : P217 : "High Resolution Light Emitting Polymer Display Driven byLow Temperature Polysilicon Thin Film Transistor with Integrated Driver", Euro Display99 Late News : P27 : It is reported to "3.8 Green OLED with Low TemperaturePoly-Si TFT" etc.
[0010] Next, the method of a gradation display of EL element 1517 is described. The analog gradation method which controls the brightness of EL element 1517 by the above electrical potential differences VGS between the gate sources of TFT1515 for EL drive has the fault of being weak in dispersion in the current characteristic of TFT1515 for EL drive. That is, if the current characteristics of TFT1515 for EL drive differ, even if it carries out the seal of approval of the same gate voltage, the current value which flows TFT1515 for EL drive and EL element 1517 will change. Consequently, the brightness of EL element 1517, i.e., gradation, will change.
[0011] Then, in order to make small effect of property dispersion of TFT1515 for EL drive and to obtain a uniform screen, the digital gradation method and the method to call are devised. This method is a method with which absolute value |VGS| of the electrical potential difference between the gate sources of TFT1515 for EL drive controls gradation by the condition below lighting starting potential (a current hardly flows), and two conditions of a larger condition (the current near max is flowing) than brightness saturation voltage. In this case, if |VGS| of TFT1515 for EL drive is made sufficiently larger than brightness saturation voltage, even if the current characteristic of TFT1515 for EL drive varies, a current value will become close to IMAX. Therefore, effect of dispersion in TFT1515 for EL drive can be made very small. As mentioned above, in order to control gradation by two conditions, ON condition (it is bright since maximum current is flowing), and an OFF condition (it is dark since a current does not flow), this method is called the digital gradation method.
[0012] However, in the case of a digital gradation method, only 2 gradation can be expressed as this approach. Then, two or more proposals of the technique of attaining many gradation-ization are made combining another method.
[0013] There is a time amount gradation method as one of the methods which attains many gradation-ization. A time amount gradation method is a method which controls the time amount which EL element 1517 has turned on, and takes out gradation by the merits and demerits of the lighting time amount. That is, an one-frame period is divided at two or more subframe periods, the number and die length of a

subframe period which have been turned on are controlled, and gradation is expressed.
[0014] Drawing 9 is referred to. Drawing 9 shows the timing chart of a time amount gradation method briefly. It is the example which sets frame frequency to 60 [Hz] and obtains the gradation of a triplet with a time amount gradation method.
[0015] As shown in drawing 9 (A), an one-frame period is divided at the subframe period for the gradation number of bits. Here, since it is a triplet, it is dividing at three subframe periods SF1-SF3. One subframe period is further divided into an address period (Ta#) and a sustain (lighting) period (Ts#) (drawing 20 (B)). The sustain period in SF1 will be called Ts1. In the case of SF2 and SF3, it will be similarly referred to as Ts2 and Ts3. Since the address periods Ta1-Ta3 are periods which write the video signal for one frame in a pixel, respectively, also in which subframe period, its die length is equal. A sustain period has the ratio of the exponentiation of 2 like Ts1:Ts2:Ts3=22:21:20=4:2:1 here.
[0016] Brightness is controlled by the merits and demerits of the marks-total LGT time amount within an one-frame period by controlling in the sustain (lighting) period from Ts1 to Ts3 as the approach of a gradation display in whether an EL element is made to turn on and one which is not made to turn on of those condition. In this example, with the combination of the sustain (lighting) period to turn on, since the die length of 23= 8 kinds of lighting time amount can be determined as shown in drawing 9 (B), 8 gradation to 0 (all black displays)-7 (all white displays) can be displayed. In a time amount gradation method, a gradation expression is performed as mentioned above. Of course, also in the spontaneous light equipment of color display, the same gradation expression is possible.
[0017] What is necessary is just to increase the number of partitions of an one-frame period, when increasing the number of gradation furthermore. When an one-frame period is divided into n subframes at a period, the ratio of the die length of a sustain (lighting) period is Ts1:Ts2. : ..... It is Ts(n-1):Tsn=2 (n-1):2 (n-2). : ..... It is set to 21:20 and it becomes possible to express 2n a kind of gradation. In addition, you may make it, as for the sequence of a subframe period, even SF1-SFn appear at random. In addition, the gradation expression is possible even if it does not necessarily make the ratio of the die length of a sustain (lighting) period into the exponentiation of 2.
[0018]
[Problem(s) to be Solved by the Invention] By the way, the trouble about the spontaneous light equipment using spontaneous light corpuscle children, such as an EL element, is described. As mentioned above, a current is always supplied and, as for the period which the EL element has turned on, the current is flowing the inside of an EL element. Thereby, the property of the EL element itself deteriorates and a brightness property changes with lightings of long duration by considering this as a cause. That is, in the EL element which deteriorated, and the EL element which has not deteriorated, even if it supplies a current on the same electrical potential difference from the same current source of supply, a difference will arise in the brightness.
[0019] An example is given and explained. Drawing 10 (A) is display screens, such as a personal digital assistant device which used spontaneous light equipment, and 1001, such as an icon for actuation, is displayed. Usually, the rate of a still picture display as shown in drawing 10 (A) for the application of such a device is large. Supposing the icon etc. is displayed in the color (gradation) brighter than a background at this time, since [that the EL element in the pixel of the part as which the icon etc. is displayed is longer than the EL element for a background display] time amount lighting will be carried out, degradation will advance more quickly.
[0020] Suppose that degradation of an EL element advanced on such conditions. The example of a display of the spontaneous light equipment after degradation is shown in drawing 10 (B) and (C). First, although it is the case of a black display like drawing 10 (B), since spontaneous light corpuscle children including an EL element will express black because the condition, i.e., an EL element, that the electrical potential difference is not impressed to the component does not light up, at the time of a black display, degradation cannot pose a problem easily. However, in a white display, even if it supplies the same current in the EL element (in this case, EL element of the part which showed the icon etc.) which deteriorated by prolonged lighting, as drawing 10 (C) shown in 1011, brightness is insufficient and nonuniformity arises.

[0021] Although there be the approach of raise the electrical potential difference impress to the EL element which deteriorated in order to solve this brightness nonuniformity , it be easy to constitute the circuit for change the applied voltage to the EL element in specific 1 pixel in the inside which the current supply source line consist of single wiring in spontaneous light equipment , and have usually be arrange in the shape of a matrix from the pixel section . Furthermore, as mentioned above, since there is dispersion in TFT for EL drive etc., it cannot be said that such an amendment approach is desirable.
[0022] As an approach for solving the above-mentioned trouble, the technique of a publication is in an application for patent 2000-273139. It explains briefly [below] using drawing 18 .
[0023] Drawing 18 is the schematic diagram of the equipment in spontaneous light equipment with a degradation amendment function given in an application for patent 2000-273139. According to this approach, the lighting time amount or lighting time amount, and lighting reinforcement of each pixel are detected by sampling 1st video-signal 1801A periodically with a counter 1802, and are memorized in memory 1803 and 1804. The operation in the amendment circuit 1805 amends the video signal for driving the pixel in which the EL element deteriorated with reference to accumulation of the detection value, and the data of aging of the brightness property of the EL element beforehand memorized in the amendment data storage section 1806, and 2nd video-signal 1801B is obtained. It has this 2nd video-signal 1801B, and an image is displayed. This amends the brightness nonuniformity in the display 1807 with which the EL element in some pixels deteriorated, and it is supposed that a uniform screen can be obtained.
[0024] However, according to the above-mentioned approach, direct detection of the condition of degradation of the EL element at a certain time is not necessarily carried out, and the condition of degradation is guessed to the last from the accumulation lighting time amount or accumulation lighting time amount, and lighting reinforcement of the component. Lighting reinforcement here has been obtained by reading not the lighting reinforcement of the EL element itself but the gradation of a digital video signal inputted, and in order to amend a video signal according to the data for amendment currently prepared beforehand, degradation which does not originate in drive time amount has the fault that it cannot respond. For example, at the count of only accumulation lighting time amount, it cannot respond to the brightness fall produced from degradation by a temperature change etc. Moreover, the poor brightness by property dispersion in early stages of the component itself cannot respond by the above-mentioned approach.
[0025]
[Objects of the Invention] Therefore, in this invention, by the approach independent of the cause of degradation of an EL element, the condition of degradation is detected, it has, a video signal is amended, and a uniform screen display without brightness nonuniformity aims at offer of spontaneous light equipment possible for a long period of time.
[0026]
[Means for Solving the Problem] In order to solve the above-mentioned trouble, the following means were provided in this invention.
[0027] In the spontaneous light equipment which has the brightness amendment function of this invention, each pixel has an EL element and an optoelectric transducer, and detects the brightness of an EL element on display by the optoelectric transducer arranged at each pixel with a certain gradation. Then, it is inputted into a display, after it calculates the insufficiency of brightness and amendment of the gradation data of a video signal is performed by the amendment circuit by measuring the criteria brightness in the same gradation of the EL element beforehand remembered to be the value detected by the optoelectric transducer. A display displays an image with the video signal after amendment. A uniform display can be maintained without producing brightness nonuniformity by the above approach also in the spontaneous light equipment which the poor brightness of an EL element produced.
[0028] Below, the configuration of the spontaneous light equipment of this invention is indicated.
[0029] The 1st description of the spontaneous light equipment of this invention has a means detect the brightness of the spontaneous light corpuscle child of each pixel, a means memorize said brightness, and a means amend said video signal according to said memorized brightness, and is characterized by to

display an image using said amended video signal in the spontaneous light equipment which inputs a video signal and displays an image.
[0030] In the spontaneous light equipment which the 2nd description of the spontaneous light equipment of this invention inputs a video signal, and displays an image The optoelectric transducer which detects the brightness of the spontaneous light corpuscle child of each pixel, and the store circuit which memorizes the brightness of the spontaneous light corpuscle child of each of said pixel detected by said optoelectric transducer, The 1st video signal is amended according to the brightness of the spontaneous light corpuscle child of each of said memorized pixel, and it is characterized by having the brightness compensator which has the signal amendment section which outputs the 2nd video signal, and the display which displays an image with said 2nd video signal.
[0031] In the spontaneous light equipment which the 3rd description of the spontaneous light equipment of this invention inputs a video signal, and displays an image The optoelectric transducer of the jxk individual (j and k are the natural number) which detects the brightness of the spontaneous light corpuscle child of each pixel, The storage which memorizes the brightness of the spontaneous light corpuscle child of each of said pixel detected by said optoelectric transducer, The 1st video signal is amended according to the brightness of the spontaneous light corpuscle child of each of said memorized pixel, and it is characterized by having the brightness compensator which has the signal amendment section which outputs the 2nd video signal, and the display which has the jxk pixel which displays an image with said 2nd video signal.
[0032] The spontaneous light equipment with which the 4th description of the spontaneous light equipment of this invention displays n bit (n is natural number and n>=2) gradation in the spontaneous light equipment of this invention The pixel which has the drive circuit which performs signal processing of a n+m bit (m is the natural number), and has the spontaneous light corpuscle child who has not produced the fall of brightness To the pixel which has the spontaneous light corpuscle child who displayed gradation and produced the fall of brightness with the n-bit video signal To the n-bit video signal, by amending a video signal using a m-bit signal, it is between the spontaneous light corpuscle child who has not produced the fall of said brightness, and the spontaneous light corpuscle child who produced the fall of said brightness, and is characterized by obtaining equal brightness.
[0033] The 5th description of the spontaneous light equipment of this invention is characterized by said amendment means performing addition processing relatively to the video signal written in the pixel which has the spontaneous light corpuscle child who has not produced the fall of brightness in the video signal written in the pixel which has the spontaneous light corpuscle child who produced the fall of brightness in the spontaneous light equipment of this invention.
[0034] The 6th description of the spontaneous light equipment of this invention is set to the spontaneous light equipment of this invention. Said amendment means To the video signal written in the pixel which has the spontaneous light corpuscle child who has not produced the fall of the pixel or brightness which has the small spontaneous light corpuscle child of a fall of brightness in a display rectangle It is characterized by performing subtraction processing relatively to the video signal written in the pixel which has a spontaneous light corpuscle child with the largest fall of brightness.
[0035] As for said storage means, the 7th description of the spontaneous light equipment of this invention is characterized by using a static mold store circuit (SRAM) in the spontaneous light equipment of this invention.
[0036] As for said storage means, the 8th description of the spontaneous light equipment of this invention is characterized by using a dynamic mold store circuit (DRAM) in the spontaneous light equipment of this invention.
[0037] As for said storage means, the 9th description of the spontaneous light equipment of this invention is characterized by using a ferroelectric store circuit (FeRAM) in the spontaneous light equipment of this invention.
[0038] In the spontaneous light equipment of this invention, the 10th description of the spontaneous light equipment of this invention writes in said storage means electrically, and is characterized by using the nonvolatile memory (EEPROM) in which read-out and elimination are possible.

[0039] The 11th description of the spontaneous light equipment of this invention is characterized by using PN mold photodiode for said optoelectric transducer as said brightness detection means in the spontaneous light equipment of this invention.
[0040] The 12th description of the spontaneous light equipment of this invention is characterized by using an PIN mold photodiode for said optoelectric transducer as said brightness detection means in the spontaneous light equipment of this invention.
[0041] The 13th description of the spontaneous light equipment of this invention is characterized by using an avalanche mold photodiode for said optoelectric transducer as said brightness detection means in the spontaneous light equipment of this invention.
[0042] Said detection means, said storage means, and said amendment means are characterized by the 14th description of the spontaneous light equipment of this invention being constituted by the circuit of the exterior of said spontaneous light equipment in the spontaneous light equipment of this invention.
[0043] The 15th description of the spontaneous light equipment of this invention is characterized by being formed on the insulator as said spontaneous light equipment with same said detection means, said storage means, and said amendment means in the spontaneous light equipment of this invention.
[0044] The 16th description of the spontaneous light equipment of this invention is characterized by said spontaneous light equipment being an EL display in the spontaneous light equipment of this invention.
[0045] The 17th description of the spontaneous light equipment of this invention is characterized by said spontaneous light equipment being a PDP display in the spontaneous light equipment of this invention.
[0046] The 18th description of the spontaneous light equipment of this invention is characterized by said spontaneous light equipment being a FED display in the spontaneous light equipment of this invention.
[0047] The 1st description of the drive approach of the spontaneous light equipment of this invention It is the drive approach of the spontaneous light equipment which inputs a video signal and displays an image. Detect the brightness of the spontaneous light corpuscle child of each pixel, and the brightness of said spontaneous light corpuscle child of each pixel who detected is memorized. The 1st video signal is amended according to the difference of said brightness of the spontaneous light corpuscle child of each pixel and criteria brightness which were memorized, the 2nd video signal is outputted, and it is characterized by displaying an image using said 2nd video signal.
[0048] The 2nd description of the drive approach of the spontaneous light equipment of this invention It is the drive approach of the spontaneous light equipment which inputs a video signal and displays an image. The brightness of the spontaneous light corpuscle child of each of said pixel which detected the brightness of the spontaneous light corpuscle child of each pixel by the optoelectric transducer, and was detected by said optoelectric transducer According to the difference of the brightness of the spontaneous light corpuscle child of each pixel and criteria brightness which memorized in the store circuit and were memorized in said store circuit, the 1st video signal is amended in the signal amendment section, the 2nd video signal is outputted, and it is characterized by displaying an image using said 2nd video signal.

[0049] The 3rd description of the drive approach of the spontaneous light equipment of this invention In the drive approach of the spontaneous light equipment of this invention, the spontaneous light equipment which displays n bit (n is natural number and n>=2) gradation The pixel which has the drive circuit which performs signal processing of a n+m bit (m is the natural number), and has the spontaneous light corpuscle child who has not produced the fall of brightness To the pixel which has the spontaneous light corpuscle child who displayed gradation and produced the fall of brightness with the n-bit video signal To the n-bit video signal, by amending a video signal using a m-bit signal, it is between the spontaneous light corpuscle child who has not produced the fall of said brightness, and the spontaneous light corpuscle child who produced the fall of said brightness, and is characterized by obtaining equal brightness.
[0050] The 4th description of the drive approach of the spontaneous light equipment of this invention is characterized by for said amendment means to perform addition processing relatively to the video signal written in the pixel which has the spontaneous light corpuscle child who has not produced the fall of brightness in the video signal written in the pixel which has the spontaneous light corpuscle child who

produced the fall of brightness in the drive approach of the spontaneous light equipment of this invention.
[0051] The 5th description of the drive approach of the spontaneous light equipment of this invention In the drive approach of the spontaneous light equipment of this invention said amendment means To the video signal written in the pixel which has the spontaneous light corpuscle child who has not produced the fall of the pixel or brightness which has the small spontaneous light corpuscle child of a fall of brightness in a display rectangle It is characterized by performing subtraction processing relatively to the video signal written in the pixel which has a spontaneous light corpuscle child with the largest fall of brightness.
[0052]
[Embodiment of the Invention] Drawing 1 is referred to. Drawing 1 shows the block diagram of the spontaneous light equipment which has the brightness amendment function of this invention. It has the store circuit 104 which memorizes the brightness which the brightness compensator which is the base of this invention consisted of the store circuit section 100, an amendment circuit 105, and optoelectric-transducer 106 grade, and the store circuit section 100 stored the data storage section 102 for amendment, and test pattern 103 grade, and was detected. As an optoelectric transducer 106 laps with a part of the spontaneous light corpuscle child's 107 luminescence side, it is arranged. Here, since the spontaneous light corpuscle child's 107 luminescence side will be suppressed when the size of an optoelectric transducer 106 is large, as for the size, it is desirable to make it as small as possible. Since the signal after carrying out photo electric conversion of the outgoing radiation light from the spontaneous light corpuscle child 107 will become feeble, a voltage swing is obtained via amplifying circuits, such as an operational amplifier.
[0053] The circuit diagram of the source signal-line drive circuit in a display 108 is shown in drawing 14 (A). Here, the display corresponding to a digital video signal is made into the example. A source signal-line drive circuit has a shift register (SR) 1401, the 1st latch circuit (Local Area Transport1) 1402, and the 2nd latch circuit (Local Area Transport2) 1403 grade. It is the brightness compensator which showed 1404 to the pixel and showed 1405 to drawing 1 .
[0054] Actuation of each part is explained. According to a clock signal (CLK) and a start pulse (SP), the sequential output of the sampling pulse is carried out from a shift register. In the 1st latch circuit, a digital video signal is held according to the timing of a sampling pulse. As shown in drawing 14 R> 4 (A), at this time, amendment is completed and the video signal is already the 2nd video signal. In the 1st latch circuit, after the maintenance for 1 level period is completed, a latch pulse is outputted and a transfer of the digital video signal to the 2nd latch circuit is performed. Then, the writing from the 2nd latch circuit to a pixel is performed. According to the sampling pulse from a shift register, maintenance of a digital video signal is again performed to coincidence by the 1st latch circuit.
[0055] Then, actuation of the whole brightness compensator is explained. First, the data storage section 102 for amendment is made to memorize beforehand the brightness to the input of a certain gradation signal as the criteria brightness about the EL element used for spontaneous light equipment. As for the EL element of each pixel, amendment of a video signal is performed according to gap from this criteria brightness. Moreover, criteria brightness may be made to memorize [in / as for this criteria brightness, it is good not to be what was limited to a certain 1 gradation, and / two or more gradation], respectively.
[0056] Next, a test pattern is inputted into a display and a screen is displayed. At this time, a test pattern's plain halftone display or plain white display etc. is desirable. And the criteria brightness mentioned above is criteria brightness in the gradation. The brightness variation per 1 gradation in a certain number of bits is memorized besides criteria brightness by the data storage section 102 for amendment. The result detected here is once memorized in a store circuit 104. Then, while the EL element is on in the pixel section according to a test pattern, the optoelectric transducer prepared in each pixel detects the brightness. For example, when a certain EL element produces degradation according to a certain cause, the brightness usually falls. Therefore, between the brightness and criteria brightness which were detected, even if it is the display by the same gradation signal, the difference of brightness arises. It calculates whether it is a part for what floor tone of the digital video signal which is carrying

out current use, and by each pixel, the difference of the brightness adds amendment to 1st video-signal 101A by the gradation, obtains 2nd video-signal 101B, and inputs into a display.
[0057] It is necessary to use memory, such as a flash memory, including a non-volatile for the data storage section 102 for amendment, and a test pattern 103 as a configuration of the store circuit section 100. Moreover, what is necessary is just to use an volatile thing as mentioned above, about a store circuit 104, since the detection result of brightness is always updated for every injection of a power source. As volatile memory, static mold memory (SRAM), dynamic mold memory (DRAM), ferroelectric random-access memory (FRAM), etc. may be used. However, as this invention, it does not limit especially about the configuration of these store circuits.
[0058] Although it is desirable to always detect, to update a store circuit 104 and to amend the video signal in real time at the time of the desirable usual image display as for the procedure of the brightness detection by the optoelectric transducer 106, since it is difficult in time, considering actual actuation of an optoelectric transducer 106, as one of the approaches, the example of performing a series of above-mentioned actuation to the power up of spontaneous light equipment is given. Of course, if what has a response quick as an optoelectric transducer can be used, since extent of a brightness fall of an EL element can be known by measuring the brightness detected by real time during the display of the image which inputs the 1st video signal and the 1st video signal concerned, and is acquired, amendment actuation can also be performed while displaying an image.
[0059] In addition, as an optoelectric transducer used for the spontaneous light equipment of this invention, minuteness, high-speed responsibility, stability, the linearity to incident light, the High Public Prosecutors Office appearance sensibility, etc. are called for. It is desirable to use a photodiode in the spontaneous light equipment of this invention from these demands. Although an example explains especially a PN-junction photodiode and a PIN junction photodiode later, formation is easy in a process, and since minute formation is possible, it can be said especially that it is desirable. In addition, as other photodiodes, although an avalanche mold photodiode etc. is mentioned, in this invention, you may constitute among these photodiodes using which thing.
[0060] Moreover, although the switch 113 is used for the change of an input of a test pattern and the usual digital video signal in drawing shown with this operation gestalt, it does not limit especially but is good by other approaches.
[0061]
[Example] The example of this invention is described below.
[0062] [Example 1] [0063] The method of attaining brightness equivalent to a normal EL element is mentioned by adding the correction value which is in the digital video signal inputted as one of the approaches of amending the brightness which ran short in the EL element which deteriorated on video-signal level, and changing into the signal on the several floor tone substantially. What is necessary is to prepare beforehand only the circuit which can process the gradation for an addition, in order to realize this most simply by the circuit design. In the case of the spontaneous light equipment of the 6-bit digital gradation (64 gradation) specification which specifically has the brightness amendment function of this invention Add the throughput for 1 bit as an object for the addition for amending, design and create as 7 bit digital gradation (128 gradation) of real, and it sets in the usual actuation. a digital video signal usual when 6 bits of low order are used and degradation arises in an EL element -- correction value -- adding -- signal processing for the addition -- the above-mentioned object for an addition -- it carries out using 1 bit. In this case, the most significant bit (Most Significant Bit:MSB) is used only as an object for signal amendment, and actual display gradation is 6 bits.
[0064] In [example 2] this example, the amendment approach of a digital video signal which is different in an example 1 is explained.
[0065] Drawing 1 and drawing 2 are referred to. Drawing 2 (A) shows a part of pixel of the display 108 in drawing 1 . In addition, since it is easy, it is not illustrating about the optoelectric transducer arranged here at the pixel section.
[0066] Here, 3 pixels of pixels 201-203 are considered. First, a pixel 201 is a pixel which has not produced degradation and pixels 202 and 203 presuppose each that a certain amount of degradation is

produced respectively. Supposing the pixel 203 has extent of degradation larger than a pixel 202 at this time, though natural, the fall of the brightness accompanying degradation will also become large. That is, if a certain halftone is displayed, brightness nonuniformity will arise like drawing 2 (B). To the brightness of a pixel 201, the brightness of a pixel 202 becomes low and the brightness of a pixel 203 becomes low further.
[0067] Next, actual amendment actuation is explained. First, amendment of the brightness by addition processing is explained.
[0068] First, the brightness of the EL element turned on with a certain gradation signal is measured beforehand, and what was made into criteria brightness, and the brightness variation per a certain digital video-signal 1 gradation are memorized in the data storage section 102 for amendment. Then, the display by a certain test pattern is performed, and brightness is changed into detection and a signal by the optoelectric transducer 106 about each pixel in a screen. The detection result of criteria brightness and the brightness in each pixel is inputted into the amendment circuit 105. Once the detection result of brightness [in / at this time / each pixel] is memorized in a store circuit 104, it is inputted into the amendment circuit 105 by read-out.
[0069] Then, in the amendment circuit 105, an operation is performed from each inputted numeric value, the amount of amendments of the digital video signal written in each pixel is determined, and it actually amends. An example is shown in drawing 2 (C). here -- the criteria brightness A -- receiving -- the brightness of a pixel 201 -- B -- the brightness of 1 pixel 202 presupposes that the brightness of B-2 and a pixel 203 was B3. Here, the amendment width of face of a digital video signal takes the difference of criteria brightness (A) and detection brightness (B1-B3), is what **(ed) the difference by the brightness variation per unit gradation (X), and is called for. here, it was shown in drawing 2 (C) -- as -- a pixel 201 -- by "0" and the pixel 202, the amount of amendments is set [the amount of amendments] to "2" by "1" and the pixel 203 by the amount of amendments. When the difference of brightness is less than 1 gradation, it approximates, respectively and the amount of amendments is determined. In this case, counting fractions as one or a cut-off may be chosen bordering on the brightness for 0.5 gradation, and it may be made to perform processing unified into either.
[0070] 1st video-signal 101A inputted into the amendment circuit 105 determines the amendment width of face in each pixel by the above-mentioned approach, and amends brightness by adding an amendment signal to a gradation signal serially. As shown in drawing 2 (D) and (E), to the digital video signal inputted into each pixel, only the part of the called-for amendment width of face adds gradation, and obtains brightness equivalent to a normal EL element. Thus, 2nd video-signal 101B which amendment completed is inputted into a display 108, and displays an image.
[0071] Then, the amendment approach by subtraction processing is described. Drawing 1 and drawing 3 are referred to. Since it is the same as that of drawing 2 (A) and (B) about drawing 3 (A) and (B), explanation is omitted here.
[0072] An optoelectric transducer detects the brightness of each pixel as well as the addition processing mentioned above, with criteria brightness, it reads into an amendment circuit and a digital video signal is amended. At this time, it is the brightness in the pixel which is degradation most and which is considered to have progressed (brightness is the lowest) which is considered as criteria brightness in the pixel section. this criteria brightness C -- receiving -- the brightness of a pixel 301 -- B -- the brightness of 1 pixel 302 presupposes that the brightness of B-2 and a pixel 303 was B3. Here, the amendment width of face of a digital video signal takes the difference of criteria brightness (C) and the detection brightness (B1-B3) in each pixel, is what **(ed) the difference by the brightness variation per unit gradation (X), and is called for. As drawing 3 (C) showed, at a pixel 301, the amount of amendments is ". - By 2" and the pixel 302, the amount of amendments is set to "0" by "-1" and the pixel 303 by the amount of amendments. When the difference of brightness is less than 1 gradation, it approximates, respectively and the amount of amendments is determined. In this case, counting fractions as one or a cut-off may be chosen bordering on the brightness for 0.5 gradation, and it may be made to perform processing unified into either.
[0073] 1st video-signal 101A inputted into the amendment circuit 105 determines the amendment width

of face in each pixel by the above-mentioned approach, and amends brightness by lowering the gradation of a digital video signal by the amount of amendments from a gradation signal serially. As shown in drawing 2 (D) and (E), only the part of the called-for amendment width of face drops gradation from the digital video signal inputted into each pixel, and it is stopped by brightness equivalent to the EL element which is the lowest [brightness]. Thus, 2nd video-signal 101B which amendment completed is inputted into a display 108.

[0074] However, when an above-mentioned means amends, the brightness of the whole screen will fall by the several floor tone (difference of the gradation by the original digital video signal, and the gradation by the 2nd video signal written in the pixel which has not produced degradation in an EL element). Therefore, by changing the potential of a current supply source line to coincidence, as shown in drawing 3 (D), by amending the brightness of the whole screen by what (VEL1+ delta->VEL 2) the electrical potential difference VEL between the two poles of an EL element is made a little high for, as shown in drawing 3 (E), a normal and uniform screen is obtained.

[0075] In amendment by the former addition processing, there is a fault that the amendment in a white display is not [/ that amendment of brightness nonuniformity is possible] effective with processing of a digital video signal (addition beyond this cannot specifically be performed as a 6-bit digital video signal when "111111" is inputted). Moreover, in amendment by the latter subtraction processing, potential control of the current supply source line for brightness amendment is added, but Since the range whose amendment is not effective is the range of a black display contrary to amendment by addition processing, It is almost uninfluential (specifically, as a 6-bit digital video signal). When "000000" is inputted, it is not necessary to perform subtraction beyond this, and an exact black display (what is necessary is just to only make the EL element into the astigmatism LGT condition) is possible between the usual EL element and the EL element which deteriorated. Moreover, the several floor tone of the black neighborhood has the to some extent high correspondence number of bits of an indicating equipment, and it has the description of hardly becoming a problem. It is an approach with both advantageous to the formation of many gradation.

[0076] Moreover, for example, it can also be called effective means by using together the amendment approach of both addition processing and subtraction processing bordering on a certain gradation to compensate both demerits.

[0077] After once switching on a power source, displaying a test pattern on the other hand and detecting the brightness of each pixel, the input network of a video signal changes to the usual thing (in the example of this specification, the switch 113 shown in drawing 1 carries out), inputs a digital video signal, and displays an image.

[0078] The detail of the display 108 in the schematic diagram shown in drawing 1 is explained using [example 3] drawing 4 . Drawing 4 (A) is the schematic diagram of the whole display, and drawing 4 (B) is the representative circuit schematic of the pixel section. In drawing 4 (A), the pixel section 405 is arranged in the center section of a substrate 400. Although the pixel section 405 is explained later, the pixel 406 which has an EL element and an optoelectric transducer, respectively is arranged in the shape of a matrix. Around the pixel section 405, the source signal-line drive circuit 401 for EL, the gate signal line drive circuit 402 for EL, the signal-line drive circuit 403 for optoelectric transducers, and the scanning-line drive circuit 404 for optoelectric transducers are arranged. In this example, although each one drive circuit is arranged around [each] the pixel section, different circuit arrangement is sufficient as accumulating the source signal-line drive circuit 401 for EL, the signal-line drive circuit 403 for optoelectric transducers or the gate signal line drive circuit 402 for EL, and the scanning-line drive circuit 404 for optoelectric transducers on one circuit, for example, countering the pixel section, and considering as both-sides arrangement etc. The signal to each drive circuit and supply of a power source are performed through FPC407.

[0079] Drawing 4 (B) expands a pixel 406. One pixel is constituted by the source signal line 411, the gate signal line 412, TFT413 for switching, TFT414 for EL drive, retention volume 415, EL element 416, the current supply source line 417, the signal output line 418, the reset signal line 419, the scanning line 420, the reference supply line 421, TFT422 for reset, TFT423 for buffers, TFT424 for selection, and

the optoelectric transducer 425. Here, although it arranges in order to hold the charge given to the gate electrode of TFT414 for EL drive, it is not necessary to necessarily arrange retention volume 415.

[0080] About lighting of an EL element, since it mentioned above, it omits here. Only the actuation of the optoelectric-transducer circumference at the time of the brightness detection by each pixel is described. If a selection pulse is inputted into the scanning line 420, TFT424 for selection will be in switch-on. In this condition, the light from EL element 416 carries out incidence to an optoelectric transducer 425, and TFT423 for buffers flows according to the charge accumulated in the optoelectric transducer 425, and it is changed into the electrical signal accompanying that brightness, and is outputted to the signal output line 418. Then, in the signal-line drive circuit 403, it is amplified using a buffer, an operational amplifier, etc., and is obtained as a voltage signal. Then, it is read into an amendment circuit through means, such as A/D conversion.

[0081] In the spontaneous light equipment which has the brightness amendment function of [example 4] this invention, in the example (drawing 1) shown with the operation gestalt The brightness compensator was put on the exterior of an indicating equipment 108, digital video-signal (1st video signal) 101A was first inputted into the amendment circuit 105, amendment was performed immediately and digital video-signal (2nd video signal) 101B [finishing / amendment] was inputted into the indicating equipment 108 through FPC. Although the height of the compatibility by the unitization of each equipment, the goodness of application, etc. are mentioned as a merit by such approach, it is one side, and it is really forming a brightness compensator and a display on the same substrate, and low-cost-izing by drastic reduction of components mark, space-saving-izing, and a high-speed drive can be realized. Here, although especially the layout on a substrate is not illustrated, it is desirable to carry out contiguity arrangement for every block, taking into consideration arrangement of a signal line etc., a wire length, etc.

[0082] [Example 5] this example explains how to produce to coincidence TFT of the pixel section of the spontaneous light equipment of this invention, and the drive circuit section (a source signal-line side drive circuit, a gate signal line side drive circuit, pixel selection-signal line side drive circuit) prepared around it. However, in order to simplify explanation, suppose that the CMOS circuit which is a base unit is illustrated about the drive circuit section.

[0083] Drawing 5 (A) is referred to. First, the substrate 5000 which consists of glass, such as barium borosilicate glass represented with this example by #7059 glass of Corning, Inc., #1737 glass, etc. or alumino borosilicate glass, is used. In addition, if it is the substrate which has translucency as a substrate 5000, it will not be limited, but a quartz substrate may be used. Moreover, the plastic plate which has the thermal resistance which can bear the processing temperature of this example may be used.

[0084] Subsequently, the substrate film 5001 which consists of insulator layers, such as oxidation silicon film, a silicon nitride film, or an oxidation silicon nitride film, is formed on a substrate 5000. Although two-layer structure is used as substrate film 5001 in this example, the structure which carried out the laminating the monolayer of said insulator layer or more than two-layer may be used. 10-200 [nm] (preferably 50-100 [nm]) formation of the oxidation silicon nitride film 5001a formed considering SiH4, NH3, and N2O as reactant gas is carried out using a plasma-CVD method as the 1st layer of the substrate film 5001. in this example, oxidation silicon nitride film 5001a (presentation ratio Si= -- 32 [%], O= 27 [%], N= 24 [%], and H= 17 [%]) of thickness 50 [nm] was formed. Subsequently, laminating formation of the oxidation silicon nitride film 5001b formed considering SiH4 and N2O as reactant gas is carried out at the thickness of 50-200 [nm] (preferably 100-150 [nm]), using a plasma-CVD method as a two-layer eye of the substrate film 5001. in this example, oxidation silicon nitride film 5001b (presentation ratio Si= -- 32 [%], O= 59 [%], N= 7 [%], and H= 2 [%]) of thickness 100 [nm] was formed.

[0085] Subsequently, the semi-conductor layers 5002-5004 are formed on the substrate film. Patterning of the crystalline substance semi-conductor film obtained by performing well-known crystallization processings (the heat crystallizing method using the catalyst of the laser crystallizing method, the heat crystallizing method, or nickel etc.) is carried out to a desired configuration, and the semi-conductor layers 5002-5004 form it, after forming the semi-conductor film which has amorphous structure with

well-known means (LPCVD a spatter, law or a plasma-CVD method, etc.). These semi-conductor layers 5002-5004 are formed by the thickness of 25-80 [nm] (preferably 30-60 [nm]). Although there is no limitation in the ingredient of the crystalline substance semi-conductor film, it is good to form preferably with silicon (silicon) or a silicon germanium (SiXGe1-X (X=0.0001-0.02)) alloy. After forming the amorphous silicon film of 55 [nm] using a plasma-CVD method, the solution containing nickel was made to hold on the amorphous silicon film in this example. After performing dehydrogenation (500 [**] 1 hour) on this amorphous silicon film, heat crystallization (550 [**] 4 hours) was performed, laser annealing processing for improving crystallization further was performed, and the crystalline substance silicon film was formed. And the semi-conductor layers 5002-5004 were formed by patterning processing using the photolithography method from this crystalline substance silicon film.
[0086] Moreover, after forming the semi-conductor layers 5002-5004, in order to control the threshold of TFT, a minute amount impurity element (boron or Lynn) may be doped.
[0087] Moreover, when producing the crystalline substance semi-conductor film by the laser crystallizing method, the excimer laser of a pulse oscillation mold or a continuation luminescence mold, and an YAG laser and YVO4 laser can be used. When using such laser, it is good to use the approach of condensing to a line the laser light emitted from the laser oscillation machine by optical system, and irradiating the semi-conductor film. Although an operation person makes **** selection, the conditions of crystallization are made into the pulse oscillation frequency 30 [Hz] when using an excimer laser, and set a laser energy consistency to 100-400 [mJ/cm2] (typically 200-300 [mJ/cm2]). Moreover, in using an YAG laser, it considers as the pulse oscillation frequency of 1-10kHz using the 2nd higher harmonic, and it is a laser energy consistency 300-600 [mJ/cm2] (typically 350-500 [mJ/cm2]) It is good to carry out. and width of face 100-1000 [mum], for example, the laser light which condensed to the line by 400 [mum], -- the whole substrate surface -- crossing -- irradiating -- the line at this time -- what is necessary is just to perform the rate of superposition of laser light (rate of overlap) as 50-90 [%]
[0088] Subsequently, wrap gate dielectric film 5005 is formed for the semi-conductor layers 5002-5004. Gate dielectric film 5005 is formed using a plasma-CVD method or a spatter by the insulator layer which sets thickness to 40-150 [nm], and contains silicon. at this example, it formed by the thickness of 110 [nm] by the plasma-CVD method the oxidation silicon nitride film (presentation ratio Si= -- 32 [%], O= 59 [%], N= 7 [%], and H= 2 [%]). Of course, gate dielectric film 5005 is not limited to an oxidation silicon nitride film, and may use the insulator layer containing other silicon as a monolayer or a laminated structure.
[0089] Moreover, when using the oxidation silicon film, TEOS (Tetraethyl Orthosilicate) and O2 can be mixed by the plasma-CVD method, and it can consider as reaction pressure 40 [Pa] and the substrate temperature 300-400 [**], it can be made to be able to discharge by RF (13.56 [MHz]) power flux density 0.5-0.8 [W/cm2], and can form. Thus, the oxidation silicon film produced can acquire a property good as gate dielectric film by heat annealing of 400-500 [**] after that.
[0090] Subsequently, laminating formation of the 1st electric conduction film 5006 of thickness 20-100 [nm] and the 2nd electric conduction film 5007 of thickness 100-400 [nm] is carried out on gate dielectric film 5005. In this example, laminating formation of the 2nd electric conduction film 5007 which consists of the 1st electric conduction film 5006 which consists of TaN film of thickness 30 [nm], and W film of thickness 370 [nm] was carried out. The TaN film was formed by the spatter and carried out the spatter within the ambient atmosphere containing nitrogen using the target of Ta. Moreover, W film was formed by the spatter which used the target of W. In addition, it can also form with the heat CVD method using 6 tungsten fluoride (WF6). Anyway, in order to use it as a gate electrode, it is necessary to attain low resistance-ization, and as for the resistivity of W film, carrying out to below 20 [muomegacm] is desirable. In W film, although W film can attain low resistivity-ization by enlarging crystal grain, when there are many impurity elements, such as oxygen, crystallization is checked and forms it into high resistance. Therefore, in this example, it is the spatter which used the target of W (purity 99.9999 [%]) of a high grade, and resistivity 9-20 [muomegacm] was able to be realized by considering enough and forming W film so that there may be no mixing of the impurity out of a gaseous

phase further at the time of membrane formation.
[0091] In addition, in this example, although TaN and the 2nd electric conduction film 5007 were set to W for the 1st electric conduction film 5006, it is not limited especially but the element with which all were chosen from Ta, W, Ti, Mo, aluminum, Cu, Cr, and Nd, or said element may be formed with the alloy ingredient or compound ingredient used as a principal component. Moreover, the semi-conductor film represented by the polycrystal silicon film which doped impurity elements, such as Lynn, may be used. Moreover, the alloy which consists of Ag, Pd, and Cu may be used. Moreover, form the 1st electric conduction film by Ta film, and use the 2nd electric conduction film as W film, and it is combined. It is good also as a combination which forms the 1st electric conduction film by the TiN film, and uses the 2nd electric conduction film as W film, which combines, forms the 1st electric conduction film by the tantalum nitride (TaN) film, and uses the 2nd electric conduction film as aluminum film and which combines, forms the 1st electric conduction film by the TaN film, and uses the 2nd electric conduction film as Cu film.
[0092] Next, 1st etching processing for forming the mask 5008 which consists of a resist using the photolithography method, as shown in drawing 5 (B), and forming an electrode and wiring is performed. The 1st etching processing performs on the 1st and 2nd etching conditions. In this example, it etched by using CF4, and Cl2 and O2 for the gas for etching, making each gas stream quantitative ratio into 25/25/10[sccm], using the ICP (Inductively Coupled Plasma: inductive-coupling mold plasma) etching method as 1st etching condition, supplying RF (13.56 [MHz]) power of 500 [W] to the electrode of a coil mold by the pressure of 1 [Pa], and generating the plasma. Here, the dry etching system (Model E645-**ICP) which used ICP by Matsushita Electric Industrial Co., Ltd. was used. RF (13.56 [MHz]) power of 150 [W] is supplied also to a substrate side (sample stage), and a negative auto-bias electrical potential difference is impressed substantially. W film is etched according to this 1st etching condition, and the edge of the 1st conductive layer is made into a taper configuration. An etch rate [as opposed to 200.39 [nm/min.] and TaN in the etch rate to W in the 1st etching condition] is 80.32 [nm/min.], and the selection ratio of W to TaN is about 2.5. Moreover, the taper angle of W becomes about 26 degrees according to this 1st etching condition.
[0093] Then, it changes into the 2nd etching condition, without removing the mask 5008 which consists of a resist as shown in drawing 5 (B). CF4 and Cl2 were used for the gas for etching, each gas stream quantitative ratio was made into 30/30 [sccm], RF (13.56 [MHz]) power of 500 [W] was supplied to the electrode of a coil mold by the pressure of 1 [Pa], the plasma was generated, and etching for about 30 seconds was performed. RF (13.56 [MHz]) power of 20 [W] is supplied also to a substrate side (sample stage), and a negative auto-bias electrical potential difference is impressed substantially. On the 2nd etching condition which mixed CF4 and Cl2, W film and the TaN film are etched to the same extent. An etch rate [as opposed to 58.97 [nm/min.] and TaN in the etch rate to W in the 2nd etching condition] is 66.43 [nm/min.]. In addition, in order to etch without leaving residue on gate dielectric film, it is good to make etching time increase at a rate of 10-20 [%] extent.
[0094] In etching processing of the above 1st, the edge of the 1st conductive layer and the 2nd conductive layer serves as a taper configuration according to the effectiveness of the bias voltage impressed to a substrate side by having been suitable in the configuration of the mask 5008 which consists of a resist. What is necessary is just to make the include angle of this taper section into 15-45 degrees. In this way, the conductive layers 5009-5013 (the 1st conductive layers 5009a-5013a and 2nd conductive layer 5009b-5013b) of the 1st configuration which consists of the 1st conductive layer and 2nd conductive layer by 1st etching processing are formed. In gate dielectric film 5005, the field which 20-50 [nm] extent etching of the field which is not covered by the conductive layers 5009-5013 of the 1st configuration was carried out, and became thin is formed.
[0095] And 1st doping processing is performed without removing the mask 5008 which consists of a resist, and the impurity element which gives n mold to a semi-conductor layer is added (drawing 5 (B)). What is necessary is just to perform doping processing with the ion doping method or ion-implantation. The conditions of the ion doping method are a dose 1x1013 to 5x1015 It considers as [atoms/cm2] and acceleration voltage is performed as 60-100 [keV]. In this example, the dose was set to 1.5x1015

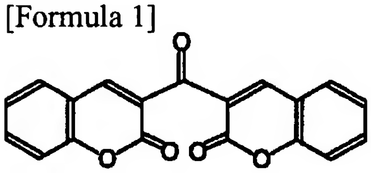
[atoms/cm2], and acceleration voltage was performed as 80 [keV]. the element which belongs to 15 groups as an impurity element which gives n mold -- typical -- Lynn -- although (P) or arsenic (As) is used -- here -- Lynn -- (P) was used. In this case, it becomes a mask to the impurity element with which the conductive layers 5009-5012 of the 1st configuration give n mold, and the high concentration impurity ranges 5014-5016 are formed in self align. In the high concentration impurity ranges 5014-5016, the impurity element which gives n mold by the density range of 1x1020 to 1x1021 [atoms/cm3] is added.
[0096] Then, 2nd etching processing is performed, without removing the mask 5008 which consists of a resist as shown in drawing 5 (C). Here, it etched by using CF4, and Cl2 and O2 for the gas for etching, making each gas stream quantitative ratio into 20/20/20[sccm], supplying RF (13.56 [MHz]) power of 500 [W] to the electrode of a coil mold by the pressure of 1 [Pa], and generating the plasma. RF (13.56 [MHz]) power of 20 [W] is supplied also to a substrate side (sample stage), and a negative auto-bias electrical potential difference is impressed substantially. An etch rate [as opposed to 124. [nm/min.] and TaN in the etch rate to W in the 2nd etching processing] is 20. [nm/min.], and the selection ratio of W to TaN is 6.05. Therefore, W film is etched alternatively. The taper angle of W became 70 degrees by this 2nd etching. The 2nd conductive layer 5017b-5021b is formed by this 2nd etching processing. On the other hand, the 1st conductive layer 5009a-5013a is hardly etched, but forms the 1st conductive layer 5017a-5021a.
[0097] Subsequently, 2nd doping processing is performed. Doping uses the 2nd conductive layer 5017b-5020b as a mask to an impurity element, and it dopes it so that an impurity element may be added by the semi-conductor layer of the taper section lower part of the 1st conductive layer. In this example, a dose 1.5x1014 [atoms/cm2], current density 0.5 [muA], and acceleration voltage 90 [keV] performed plasma doping, using P (Lynn) as an impurity element. In this way, the low concentration impurity ranges 5022-5024 which lap with the 1st conductive layer are formed in self align. The concentration of Lynn (P) added to these low concentration impurity ranges 5022-5024 is 1x1017 to 5x1018 [atoms/cm3], and has the loose concentration gradient according to the thickness of the taper section of the 1st conductive layer. In addition, in the semi-conductor layer which laps with the taper section of the 1st conductive layer, although high impurity concentration is low a little toward the edge of the taper section of the 1st conductive layer to the inside, it is almost comparable concentration. Moreover, an impurity element is added by the high concentration impurity ranges 5014-5016 (drawing 6 (A)).
[0098] Subsequently, as shown in drawing 6 (B), 3rd etching processing is performed using the photolithography method. The mask 5025 which consists of a resist is formed in the field which does not perform 3rd etching. In this 3rd etching processing, the taper section of the 1st conductive layer is etched partially, and it is carried out in order to make it the configuration which laps with the 2nd conductive layer.
[0099] Using Cl2 and SF6 as etching gas, the etching conditions in the 3rd etching processing make each gas stream quantitative ratio 10/50 [sccm], and perform it using the ICP etching method like the 1st and 2nd etching. In addition, the etch rate to TaN in the 3rd etching processing is 111.2 [nm/min.], and the etch rate to gate dielectric film is 12.8 [nm/min.].
[0100] In this example, it etched by supplying RF (13.56 [MHz]) power of 500 [W] to the electrode of a coil mold by the pressure of 1.3 [Pa], and generating the plasma. RF (13.56 [MHz]) power of ten [W] is supplied also to a substrate side (sample stage), and a negative auto-bias electrical potential difference is impressed substantially. Of the above, the 1st conductive layer 5026a-5028a is formed.
[0101] Of the 3rd above-mentioned etching, the impurity ranges (LDD field) 5029-5030 which do not lap with the 1st conductive layer 5026a-5028a are formed. In addition, the impurity range (GOLD field) 5022 has lapped with 1st conductive layer 5017a.
[0102] thus, this example could form in coincidence the impurity ranges (LDD field) 5029-5030 which do not lap with the 1st conductive layer 5026a-5028a, and the impurity range (GOLD field) 5022 which laps with 1st conductive layer 5017a, and embraced the TFT property -- it makes and a part injury is attained.
[0103] Subsequently, after removing the mask 5025 which consists of a resist, etching processing of the

gate dielectric film 5005 is carried out. Etching processing here uses CHF3 for etching gas, and is performed using a reactive-ion-etching method (the RIE method). At this example, 3rd etching processing was performed by the chamber pressure 6.7 [Pa], the RF power 800 [W], and the CHF3 quantity of gas flow 35 [sccm]. Thereby, a part of high concentration impurity ranges 5014-5016 are exposed, and gate dielectric film 5005a-5005d is formed.
[0104] Next, the mask 5031 which newly consists of a resist is formed, and 3rd doping processing is performed. The impurity ranges 5032-5033 where the impurity element which gives the 2nd conductivity type (p mold) with said 1st reverse conductivity type (n mold) to the semi-conductor layer used as the barrier layer of the p channel mold TFT by this 3rd doping processing was added are formed. (Drawing 3 (C)) 1st conductive layer 5028a is used as a mask to an impurity element, the impurity element which gives p mold is added, and an impurity range is formed in self align.
[0105] In this example, impurity ranges 5032-5033 are formed by the ion doping method for having used diboron hexahydride (B-2 H6). In addition, in the case of this 3rd doping processing, the semi-conductor layer which forms the n channel mold TFT is covered with the mask 5031 which consists of a resist. Although Lynn is added by concentration different, respectively by the 1st doping processing and the 2nd doping processing in impurity ranges 5032-5033, in order to function as the source field and drain field of the p channel mold TFT by carrying out doping processing so that the concentration of the impurity element which gives p mold also in which the field may be set to 2x1020 to 2x1021 [atoms/cm3], a problem is not produced at all.
[0106] An impurity range is formed in each semi-conductor layer at the process to the above. In addition, by this example, after etching gate dielectric film, how to dope an impurity (B) was shown, but an impurity may be doped without etching gate dielectric film.
[0107] Subsequently, as the mask 5031 which consists of a resist is removed and it is shown in drawing 7 (A), the 1st interlayer insulation film 5034 is formed. It forms by the insulator layer which sets thickness to 100-200 [nm], and contains silicon, using a plasma-CVD method or a spatter as this 1st interlayer insulation film 5034. In this example, the oxidation silicon nitride film of thickness 150 [nm] was formed by the plasma-CVD method. Of course, the 1st interlayer insulation film 5034 is not limited to an oxidation silicon nitride film, and may use the insulator layer containing other silicon as a monolayer or a laminated structure.
[0108] Subsequently, the process which carries out activation of the impurity element added by each semi-conductor layer is performed. This activation process is performed by the heat annealing method for using a furnace annealing furnace. As a heat annealing method, the oxygen density performed activation by 550 [**] and heat treatment of 4 hours below 1 [ppm] at this example that what is necessary is just to carry out to 400-700 [**], and a representation target by 500-550 [**] in the nitrogen-gas-atmosphere mind below 0.1 [ppm] preferably. In addition, the laser annealing method or the rapid thermal annealing method (RTA law) other than the heat annealing method is applicable.
[0109] In addition, in this example, gettering is carried out to the impurity range (5014, 5015, 5032) where nickel used as a catalyst at the above-mentioned activation and coincidence on the occasion of crystallization contains high-concentration P, and the nickel concentration in the semi-conductor layer which mainly serves as a channel formation field is reduced. Thus, an OFF state current value falls, high electric field effect mobility is obtained from crystallinity being good, and TFT which has the produced channel formation field can attain a good property.
[0110] Moreover, activation may be performed before forming the 1st interlayer insulation film 5034. However, when the used wiring material is weak with heat, it is desirable to perform activation, after forming an interlayer insulation film 5034 (the insulator layer which uses silicon as a principal component, for example, a silicon nitride film), in order to protect wiring etc. like this example.
[0111] In addition, after performing activation, doping processing may be performed, and the 1st interlayer insulation film 5034 may be made to form.
[0112] Furthermore, in the ambient atmosphere containing the hydrogen of 3-100 [%], heat treatment of 1 - 12 hours is performed by 300-550 [**], and the process which hydrogenates a semi-conductor layer is performed. In this example, 410 [**] and heat treatment of 1 hour were performed in nitrogen-gas-

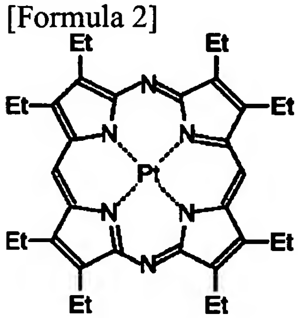
atmosphere mind that about 3 [%] contains hydrogen. This process is a process which carries out termination of the dangling bond of a semi-conductor layer by the hydrogen contained in an interlayer insulation film 5034. As other means of hydrogenation, plasma hydrogenation (the hydrogen excited by the plasma is used) may be performed.
[0113] Moreover, when using the laser annealing method as activation, after performing the above-mentioned hydrogenation, it is desirable to irradiate laser light, such as an excimer laser and an YAG laser.
[0114] Then, as shown in drawing 7 (B), the flattening film 5035 which consists of organic resin etc. is formed. At this example, the level difference on the substrate formed of TFT is formed by the thickness which can fully carry out flattening using the acrylic which is excellent in flattening. desirable -- the thickness of the flattening film -- 1-5 [mum] (still more preferably 2-4 [mum]) -- then, it is good.
[0115] Subsequently, a contact hole is formed in the 1st agreement insulator layer 5034 and flattening film 5035, and wiring 5036-5041 is formed. In this example, although patterning of the cascade screen of Ti film of thickness 50 [nm] and the alloy film (alloy film of aluminum and Ti) of thickness 500 [nm] is carried out and it is formed, other electric conduction film may be used. Moreover, the gate signal line 5042 is also formed in coincidence with wiring and this ingredient at this time.
[0116] Subsequently, the 2nd interlayer insulation film 5043 which consists of an insulating material containing silicon or organic resin by the plasma-CVD method is formed. As an insulating material containing silicon, oxidation silicon, silicon nitride, and oxidation silicon nitride can be used, and polyimide, a polyamide, an acrylic, BCB (benz-cyclo-butene), etc. can be used as organic resin. in addition -- as the thickness of an oxidation silicon nitride film -- desirable -- 1-5 [mum] (still more preferably 2-4 [mum]) -- then, it is good. The oxidation silicon nitride film is effective when suppressing degradation of an EL element, since there is little moisture contained in the film itself.
[0117] Then, the contact hole which reaches wiring 5037 is formed and the cathode electrode 5044 of an optoelectric transducer is formed. In this example, although the aluminum by the spatter is used for this metal membrane, other metals, for example, Ti, Ta, W, Cu, etc., can be used. Moreover, you may form not by the monolayer but by the laminated structure which consists of two or more metal membranes.
[0118] Next, membranes are formed, patterning of the amorphous silicon film containing hydrogen is carried out, and the photo-electric-conversion layer 5045 is formed. Then, similarly, after complete membrane formation, patterning is performed and the cathode electrode 5046 which consists of transparence electric conduction film is formed.
[0119] Next, as shown in drawing 8 (A), the 3rd interlayer insulation film 5047 is formed. As the 3rd interlayer insulation film 5047, it is using resin, such as polyimide, a polyamide, polyimidoamide, and an acrylic, and a flat front face can be obtained. The polyimide film of thickness 0.7 [mum] was formed in this example.
[0120] Subsequently, the pixel electrode 5048 is formed after formation of the contact hole which reaches wiring 5040 by forming and carrying out patterning of the transparence electric conduction film by the thickness of 80-120 [nm] (drawing 8 (A)). In addition, in this example, the transparence electric conduction film which mixed the zinc oxide (ZnO) of 2-20 [%] to the indium oxide tin (ITO) film or indium oxide is used for the pixel electrode 5048.
[0121] Next, the EL layer 5049 is formed with vacuum deposition, and the cathode electrode (MgAg electrode) 5050 is further formed with vacuum deposition. It is desirable to precede to form the EL layer 5049 and the cathode electrode 5050 at this time, to heat-treat to the pixel electrode 5048, and to remove moisture completely. In addition, although the MgAg electrode is used as a cathode electrode of an EL element in this example, you may be other well-known ingredients.
[0122] In addition, a well-known ingredient can be used as an EL layer 5049. Although two-layer structure which becomes by the electron hole transportation layer (Hole transporting layer) and the luminous layer (Emitting layer) is used as EL layer in this example, either a hole-injection layer, an electron injection layer or an electronic transportation layer may be prepared. Thus, various examples are already reported and combination may use which the configuration.
[0123] In this example, polyphenylene vinylene is formed with vacuum deposition as an electron hole

transportation layer. Moreover, as a luminous layer, what carried out 30-40 [%] molecular dispersion of the PBD of 1, 3, and 4-OKISA diazole derivative to the polyvinyl carbazole is formed with vacuum deposition, and about 1 [%] addition of the coumarin 6 is carried out as a green emission center.
[0124] Moreover, in order to protect the EL layer 5049 from oxygen or moisture, it is desirable to form a protective coat etc. In this example, the silicon nitride film of 300 [nm] thickness is prepared as passivation film 5051. You may form continuously without this passivation film's 5051 also carrying out atmospheric-air release after cathode electrode 5050 formation.
[0125] In addition, what is necessary is just to set to 80-200 [nm] (typically 100-150 [nm]) thickness whose thickness of the EL layer 5049 is 10-400 [nm] (typically 60-150 [nm]), and the cathode electrode 5050.
[0126] In this way, EL module of structure as shown in drawing 8 (A) is completed. In addition, in the making process of EL module in this example, on the configuration of a circuit, and the relation of a process, although the gate signal line is formed by aluminum which is the wiring material which forms a source signal line and forms the source and a drain electrode by Ta and W which are the ingredient which forms the gate electrode, a different ingredient may be used.
[0127] Drawing 16 is the example of circuit arrangement of the pixel section in the spontaneous light equipment created according to the process explained by this example. The number given to each part is the same as that of what was given to drawing 4 which is an equal circuit. drawing 5 - drawing 8 -- inside -- alpha-alpha -- ' -- beta-beta -- ' -- gamma-gamma -- ' -- it is -- a thing -- the cross section of the same sign part in this drawing 16 -- corresponding .
[0128] By this example, the drive circuit which consists of TFT, and the pixel section shown in drawing 8 (A) can be formed on the same substrate.
[0129] In addition, in this example, although the configuration of using the p channel mold TFT for TFT413 for switching at the n channel mold TFT and TFT414 for EL drive was shown since it became inferior-surface-of-tongue outgoing radiation (the direction of outgoing radiation of light is a TFT substrate side) from the component configuration of an EL element, it does not pass over this example in one desirable gestalt, and it does not need to be restricted to this.
[0130] In addition, in this example, although the structure of making the cathode electrode 5050 forming was shown after making the EL layer 5049 form on the pixel electrode (anode plate) 5048, it is good also as structure of making EL layer and an anode plate forming on a pixel electrode (cathode). Moreover, as for TFT for switching, and TFT for EL drive, it is desirable at this time to form with the n channel mold TFT which has the low concentration impurity range (LDD field) explained by this example.
[0131] However, unlike the inferior-surface-of-tongue outgoing radiation (the outgoing radiation light from EL is irradiated at the active-matrix substrate side which forms TFT) explained until now, the gestalt of top-face outgoing radiation is taken in this case. An example is shown in drawing 17 . In this case, the light sensing portion of an optoelectric transducer is also made into structure contrary to this example according to the luminescence direction of an EL element. Furthermore, after formation of the 2nd interlayer insulation film 5043, the sequence of a process also forms EL layer previously and takes the process sequence which forms the 3rd interlayer insulation film 5047 continuously, and forms an optoelectric transducer after that.
[0132] [Example 6] drawing 13 is referred to. In the spontaneous light equipment which has the brightness amendment function of this invention, also when the display corresponds to an analog video signal, it can apply easily. In such a case, the 2nd video signal (digital video signal) outputted from the amendment circuit 1305 is changed into an analog video signal by the D/A conversion circuit 1314, is inputted into the display 1308 corresponding to an analog video signal, and the display of an image is performed.
[0133] The circuit diagram of the source signal-line drive circuit in the display 1308 in drawing 13 is shown in drawing 14 (B). Here, the display corresponding to an analog video signal is made into the example. A source signal-line drive circuit has a shift register (SR) 1411, a level shifter 1412, a buffer 1413, and sampling switch 1414 grade. The brightness compensator which showed 1415 to the pixel and

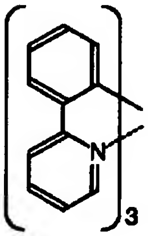
showed 1416 to drawing 13 , and 1417 are D/A conversion circuits.
[0134] Actuation of each part is explained. According to a clock signal (CLK) and a start pulse (SP), the sequential output of the sampling pulse is carried out from a shift register. Then, the voltage swing of a pulse is expanded by the level shifter and it is outputted via a buffer. In a brightness compensator, amendment is performed, respectively, and a digital video signal is changed into an analog video signal in a D/A conversion circuit, and is inputted into a video signal line. According to the timing of a sampling pulse, a sampling switch opens after that, the analog video signal inputted into the video signal line is sampled, and an image is displayed by writing electrical-potential-difference information in a pixel.
[0135] In addition, in the example shown in drawing 13 , although the brightness compensator is formed in the exterior of a display, it may really form these on the same substrate as the example 4 described.
[0136] In [example 7] this invention, external luminescence quantum efficiency can be raised by leaps and bounds by using EL ingredient which can use the phosphorescence from a triplet exciton for luminescence. Thereby, low-power-izing of an EL element, reinforcement, and lightweight-ization are attained.
[0137] Here, a triplet exciton is used and the report which raised external luminescence quantum efficiency is shown.
(T.Tsutsui, C.Adachi, S.Saito, Photochemical Processes in Organized Molecular Systems, ed.K.Honda, (Elsevier Sci.Pub., Tokyo,1991)p.437.)
The molecular formula of EL ingredient (coumarin coloring matter) reported by the above-mentioned paper is shown below.
[0138]
[Formula 1]



[0139] (M.A.Baldo, D.F.O'Brien, Y.You, A.Shoustikov, S.Sibley, M.E.Thompson, S.R.Forrest, Nature 395(1998)p.151.)
The molecular formula of EL ingredient (Pt complex) reported by the above-mentioned paper is shown below.
[0140]
[Formula 2]



[0141] (M.A.Baldo, S.Lamansky, P.E.Burrows, M.E.Thompson, S.R.Forrest, Appl.Phys.Lett.,75(1999) p.4.)
(T.Tsutsui, M.-J.Yang, M.Yahiro, K.Nakamura, T.Watanabe, T.tsuji, Y.Fukuda, T.Wakimoto, S.Mayaguchi, Jpn.Appl.Phys., 38(12B)(1999)L1502.)
The molecular formula of EL ingredient (Ir complex) reported by the above-mentioned paper is shown below.
[0142]
[Formula 3]



[0143] If phosphorescence luminescence from a triplet exciton can be used as mentioned above, implementation of one 3 to 4 times the high external luminescence quantum efficiency of this will be attained from the case where the firefly luminescence from a singlet exciton is used theoretically. In addition, it constructs with any configuration of an example 1 - an example 6 freely, and the configuration of this example can be faded and carried out.
[0144] Since the EL display adapting the spontaneous light equipment of [example 8] this invention is a spontaneous light type, it is excellent in the visibility in a bright location compared with a liquid crystal display, and moreover, its angle of visibility is large. Therefore, it can use as a display of various electronic equipment.
[0145] In addition, all displays for information displays, such as a display for personal computers, a display for TV broadcast reception, and a display for an advertising display, are contained in an EL display. Moreover, in addition to this, the spontaneous light equipment of this invention can be used for the display of various electronic equipment.
[0146] As electronic equipment of such this invention, the picture reproducer (equipment equipped with the display which specifically reproduces record media, such as a digital videodisc (DVD), and can display the image) equipped with a video camera, a digital camera, a goggles mold indicating equipment (head mount display), a navigation system, sound systems (a car audio, audio component stereo, etc.), a note type personal computer, a game device, Personal Digital Assistants (a mobile computer, a cellular phone, a handheld game machine, or digital book), and a record medium etc. is mentioned. Since importance is attached to the size of an angle of visibility, as for especially the Personal Digital Assistant with seeing [much] from across, it is desirable to use an EL display. The example of these electronic equipment is shown in drawing 11 and drawing 12 .
[0147] Drawing 11 (A) is an EL display and contains a case 3301, susceptor 3302, and display 3303 grade. The spontaneous light equipment of this invention can be used by the display 3303. Since it is a spontaneous light type, the back light of an EL display is unnecessary, and it can be made into a display thinner than a liquid crystal display.
[0148] Drawing 11 (B) is a video camera and contains a body 3311, a display 3312, the voice input section 3313, the actuation switch 3314, a dc-battery 3315, and television section 3316 grade. The spontaneous light equipment of this invention can be used by the display 3312.
[0149] Drawing 11 (C) is a part of head mount EL display (right one side), and contains a body 3321, a signal cable 3322, the head fixed band 3323, a display 3324, optical system 3325, and display 3326 grade. The spontaneous light equipment of this invention can be used with a display 3326.
[0150] Drawing 11 (D) is the picture reproducer (specifically DVD regenerative apparatus) equipped with the record medium, and contains a body 3331, record media (DVD etc.) 3332, the actuation switch 3333, a display (a) 3334, and (Display b) 3335 grade. a display -- (-- a --) -- 3334 -- mainly -- image information -- displaying -- a display -- (-- b --) -- 3335 -- mainly -- text -- displaying -- although -- this invention -- spontaneity -- light -- equipment -- these -- a display -- (-- a --) -- 3334 -- a display -- (-- b --) -- 3335 -- it can use . In addition, a home video game machine machine etc. is contained in the picture reproducer equipped with the record medium.
[0151] Drawing 11 (E) is a goggles mold indicating equipment (head mount display), and contains a body 3341, a display 3342, and the arm section 3343. The spontaneous light equipment of this invention can be used by the display 3342.
[0152] Drawing 11 (F) is a personal computer and contains a body 3351, a case 3352, a display 3353,

and keyboard 3354 grade. The spontaneous light equipment of this invention can be used by the display 3353.
[0153] In addition, if the luminescence brightness of EL ingredient will become high in the future, it will also become possible to carry out expansion projection of the light containing the outputted image information with a lens etc., and to use for the projector of a front mold or a rear mold.
[0154] Moreover, the above-mentioned electronic equipment displays more often the information distributed through electronic communication lines, such as the Internet and CATV (cable television), and its opportunity to display especially animation information has been increasing. Since the speed of response of EL ingredient is very high, an EL display is desirable to a movie display.
[0155] Moreover, in order that the part which is emitting light may consume power, as for an EL display, for electrical-power-consumption-saving-izing, it is desirable to display information that the amount of light-emitting part decreases as much as possible. Therefore, when using an EL display for the display which is mainly concerned with text like a Personal Digital Assistant especially a cellular phone, or a sound system, it is desirable to drive so that text may be formed by part for a light-emitting part by making a nonluminescent part into a background.
[0156] Drawing 12 (A) is a cellular phone and contains a body 3401, the voice output section 3402, the voice input section 3403, a display 3404, the actuation switch 3405, and an antenna 3406. The spontaneous light equipment of this invention can be used by the display 3404. In addition, a display 3404 can stop the power consumption of a cellular phone by displaying a white alphabetic character on a black background.
[0157] Drawing 12 (B) is a car audio and includes a body 3411, a display 3412, and the actuation switches 3413 and 3414 in a sound system and a concrete target. The spontaneous light equipment of this invention can be used by the display 3412. Moreover, although this example shows the audio for mount, you may use for a pocket mold or a sound system for home use. In addition, a display 3414 can stop power consumption by displaying a white alphabetic character on a black background. Especially this is effective in the sound system of a pocket mold.
[0158] drawing 12 -- (-- C --) -- a digital camera -- it is -- a body -- 3501 -- a display -- (-- A --) -- 3502 -- an eye contacting part -- 3503 -- actuation -- a switch -- 3504 -- a display -- (-- B --) -- 3505 -- a dc-battery -- 3506 -- containing . this invention -- an electro-optic device -- a display -- (-- A --) -- 3502 -- a display -- (-- B --) -- 3505 -- it can use .
[0159] As mentioned above, the applicability of this invention is very wide, and using for the electronic equipment of all fields is possible. Moreover, the electronic equipment of this example may apply which configuration shown in the example 1 - the example 7.
[Effect of the Invention] The spontaneous light equipment of this invention can amend lack of the brightness by degradation or other causes of an EL element by the circuit side, and the spontaneous light equipment which can display a uniform screen without brightness nonuniformity can be offered.

[Translation done.]

* NOTICES *

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Brightness detection of this invention, the block diagram of the spontaneous light equipment which has an amendment function.
[Drawing 2] Drawing having shown the amendment approach by addition processing.
[Drawing 3] Drawing having shown the amendment approach by subtraction processing.
[Drawing 4] The block diagram of the indicating equipment in the spontaneous light equipment which has brightness detection of this invention, and an amendment function, and the representative circuit schematic of the pixel section.
[Drawing 5] Drawing having shown the example of a creation process of active-matrix mold spontaneous light equipment.
[Drawing 6] Drawing having shown the example of a creation process of active-matrix mold spontaneous light equipment.
[Drawing 7] Drawing having shown the example of a creation process of active-matrix mold spontaneous light equipment.
[Drawing 8] Drawing having shown the example of a creation process of active-matrix mold spontaneous light equipment.
[Drawing 9] Drawing explaining a time amount gradation method.
[Drawing 10] Drawing having shown generating of the brightness nonuniformity of the screen by a spontaneous light corpuscle child's degradation.
[Drawing 11] Drawing having shown the application to the electronic equipment of the spontaneous light equipment which has brightness detection of this invention, and an amendment function.
[Drawing 12] Drawing having shown the application to the electronic equipment of the spontaneous light equipment which has brightness detection of this invention, and an amendment function.
[Drawing 13] Brightness detection of this invention, the block diagram of the spontaneous light equipment which has an amendment function.
[Drawing 14] The block diagram of the source signal-line drive circuit of the digital video-signal input method in the spontaneous light equipment which has brightness detection of this invention, and an amendment function, and an analog signal input method.
[Drawing 15] Drawing having shown an example of conventional spontaneous light equipment.
[Drawing 16] Drawing having shown an example of the circuit pattern of the pixel section in the spontaneous light equipment which has brightness detection of this invention, and an amendment function.
[Drawing 17] Drawing having shown the example of a creation process of active-matrix mold spontaneous light equipment.
[Drawing 18] The block diagram of the spontaneous light equipment which has the amendment function of a publication in an application for patent 2000-273139.

[Translation done.]

* NOTICES *

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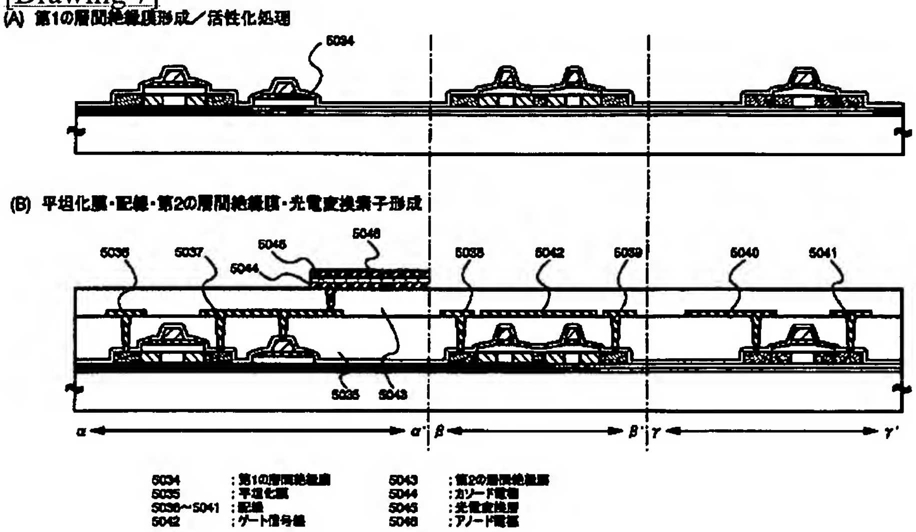
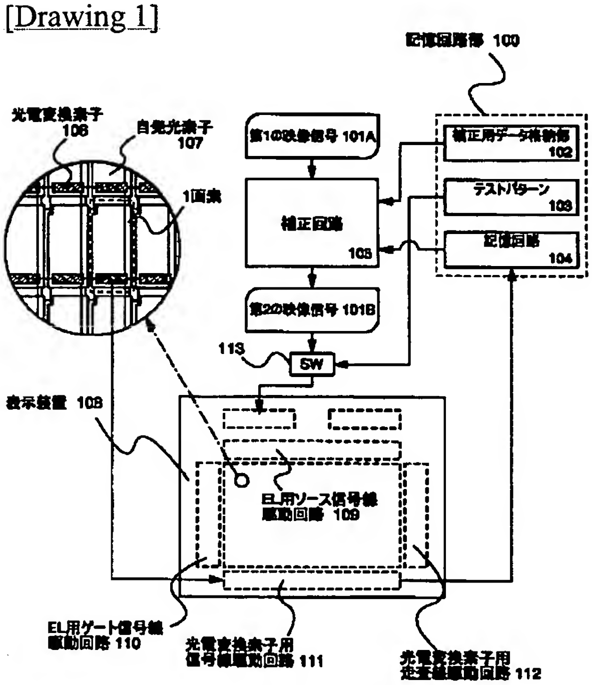
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

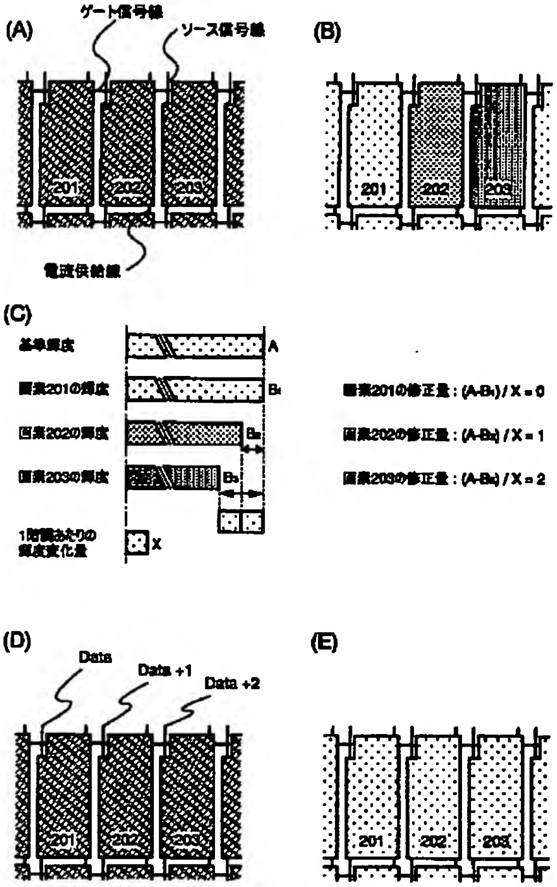
[Drawing 7]



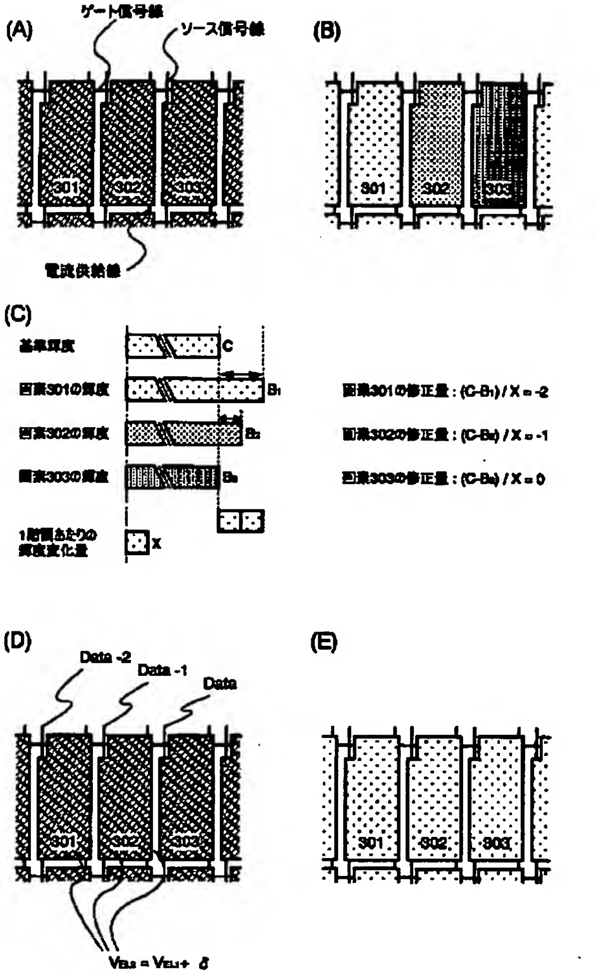
[Drawing 1]



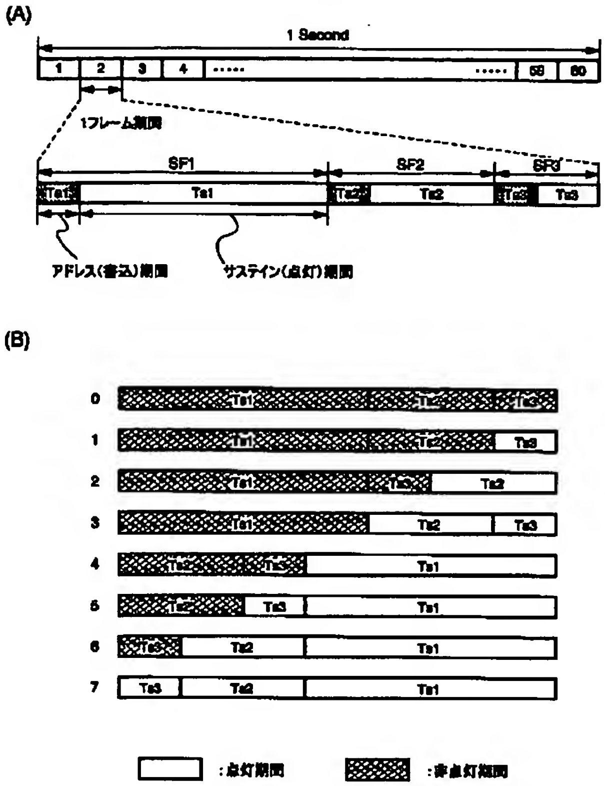
[Drawing 2]


(A)
ゲート信号線
ソース信号線
201
202
203
電流供給線
(B)
201
202
203
(C)
A
B1
B2
B3
X
画素201の修正量 : (A-B1) / X = 0
画素202の修正量 : (A-B2) / X = 1
画素203の修正量 : (A-B3) / X = 2
(D)
Data
Data +1
Data +2
201
202
203
(E)
201
202
203

[Drawing 3]

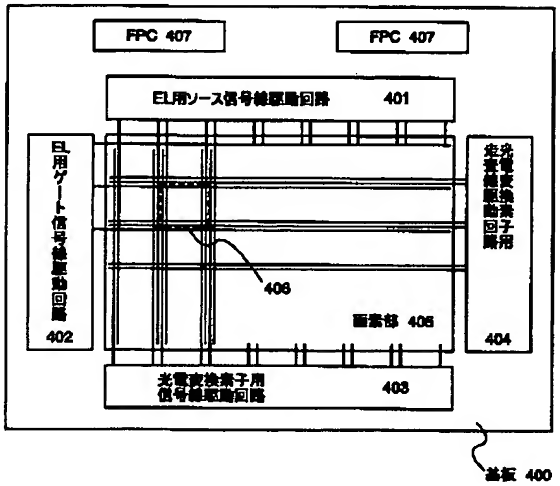

(A)
ゲート信号線
ソース信号線
301
302
303
電流供給線
(B)
301
302
303
(C)
基準輝度
C
画素301の輝度
B1
画素302の輝度
B2
画素303の輝度
B3
1階調あたりの輝度変化量
X
画素301の修正量 : (C-B1) / X = -2
画素302の修正量 : (C-B2) / X = -1
画素303の修正量 : (C-B3) / X = 0
(D)
Data -2
Data -1
Data
301
302
303
VEL2 = VEL1+ δ
(E)
301
302
303

[Drawing 9]

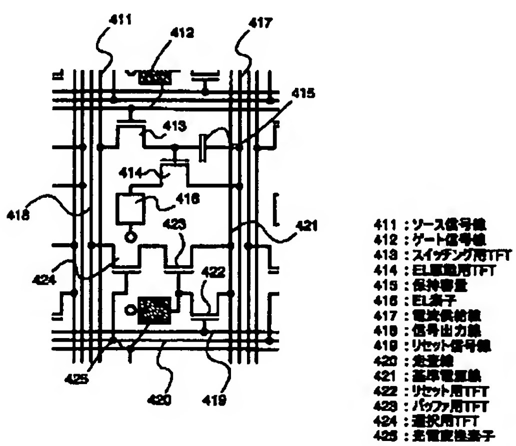

(A)
1 Second
1
2
3
4
59
60
1フレーム期間
SF1
SF2
SF3
Ts1
Ts2
Ts3
アドレス(書込)期間
サステイン(点灯)期間
(B)
0
1
2
3
4
5
6
7
:点灯期間
:非点灯期間

[Drawing 4]

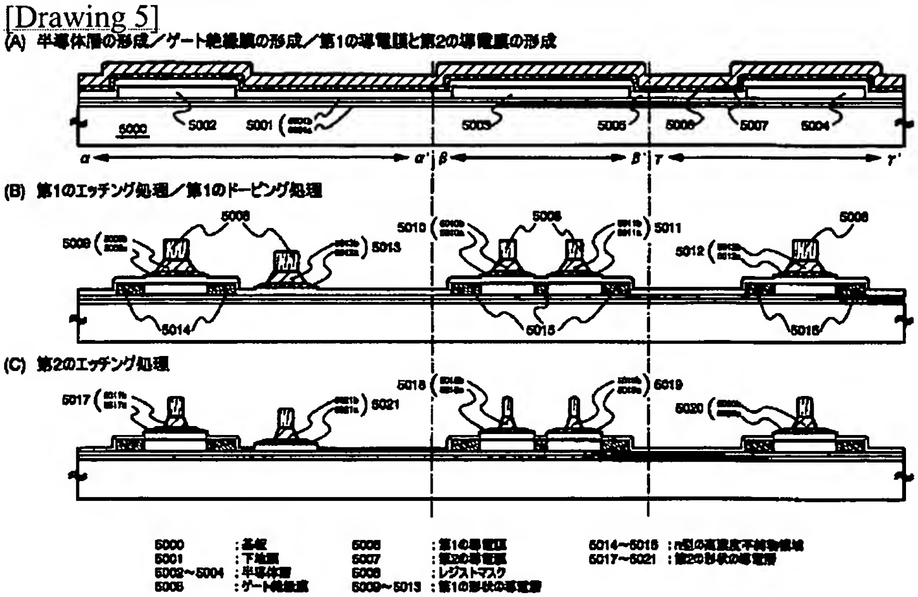
(A)



(B)

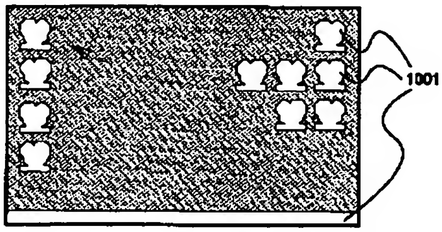


[Drawing 5]



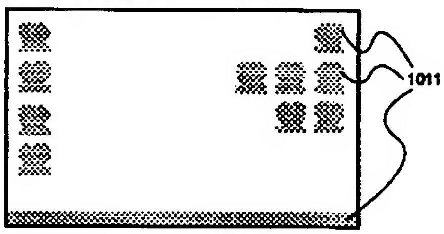
[Drawing 10]

(A) 静止画像表示時



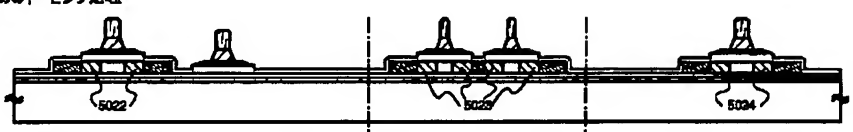
(B) 黒表示時（発光素子は消灯状態）

(C) 白表示時（発光素子は点灯状態）

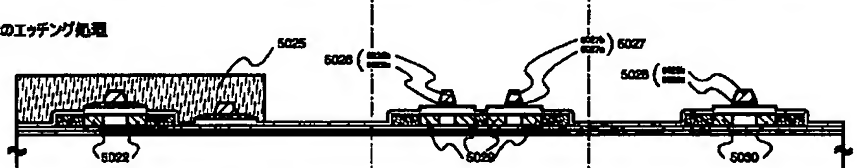


[Drawing 6]

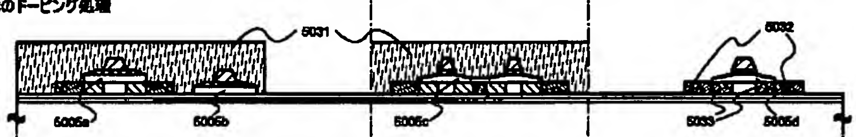
(A) 第2ののドーピング処理



(B) 第3のエッチング処理



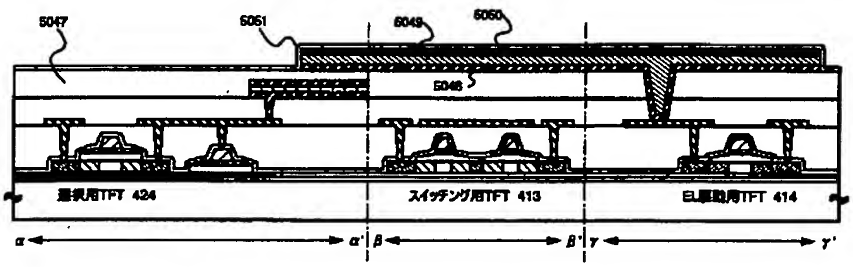
(C) 第3のドーピング処理



5005a～5005d	：ゲート絶縁膜	5029～5030	：n型の低濃度不純物領域（LDD領域）
5022～5024	：n型の低濃度不純物領域（GOLD領域）	5031	：レジストマスク
5025	：レジストマスク	5032	：p型の高濃度不純物領域
5026～5028	：第3の形状の導電層	5033	：p型の高濃度不純物領域

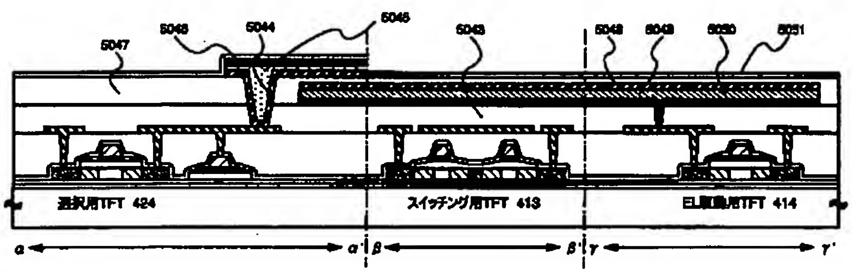
[Drawing 8]

(A) 第3の層間絶縁膜・EL素子・パッシベーション膜形成



6047 ：第3の層間絶縁膜
6048 ：画素電極(透明電極)
6049 ：EL層
6050 ：陰極電極
6051 ：パッシベーション膜

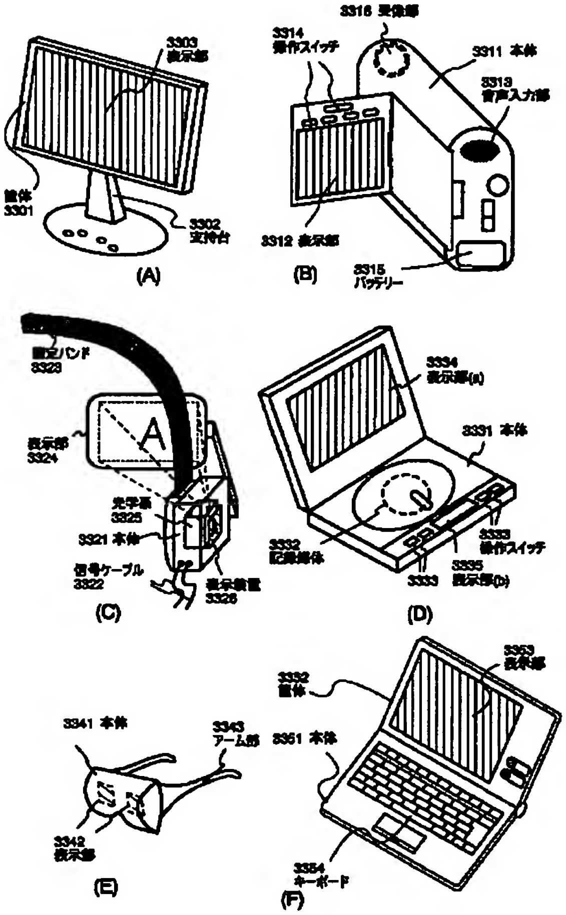
[Drawing 17]



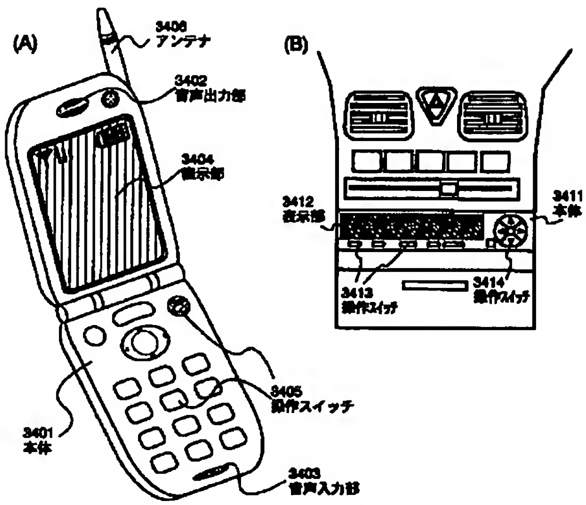
6043 ：第2の層間絶縁膜
6044 ：カソード電極
6045 ：光電変換層
6046 ：アノード電極

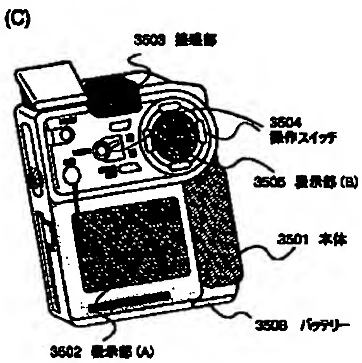
6047 ：第3の層間絶縁膜
6048 ：画素電極(透明電極)
6049 ：EL層
6050 ：陰極電極
6051 ：パッシベーション膜

[Drawing 11]

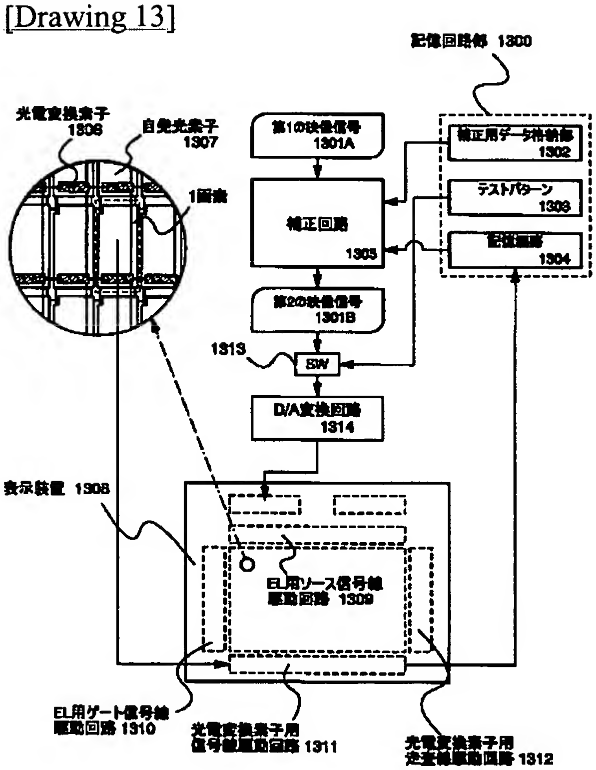

3303 表示部
筐体 3301
3302 支持台
(A)
3316 受像部
3314 操作スイッチ
3311 本体
3313 音声入力部
3312 表示部
3315 バッテリー
(B)
3323
表示部 3324
光学系 3325
3321 本体
信号ケーブル 3322
表示装置 3326
(C)
3334 表示部(a)
3331 本体
3332 記録媒体
3333 操作スイッチ
3335 表示部(b)
3333
(D)
3341 本体
3343 アーム部
3342 表示部
(E)
3353 表示部
3352 筐体
3351 本体
3354 キーボード
(F)

[Drawing 12]

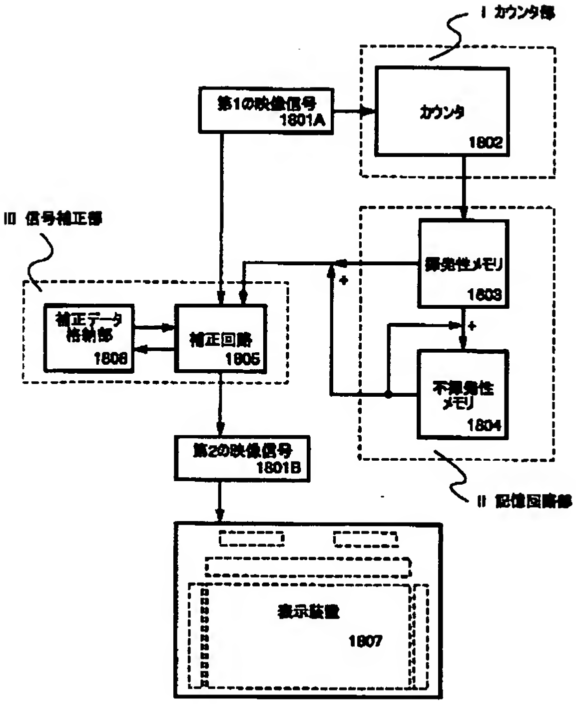




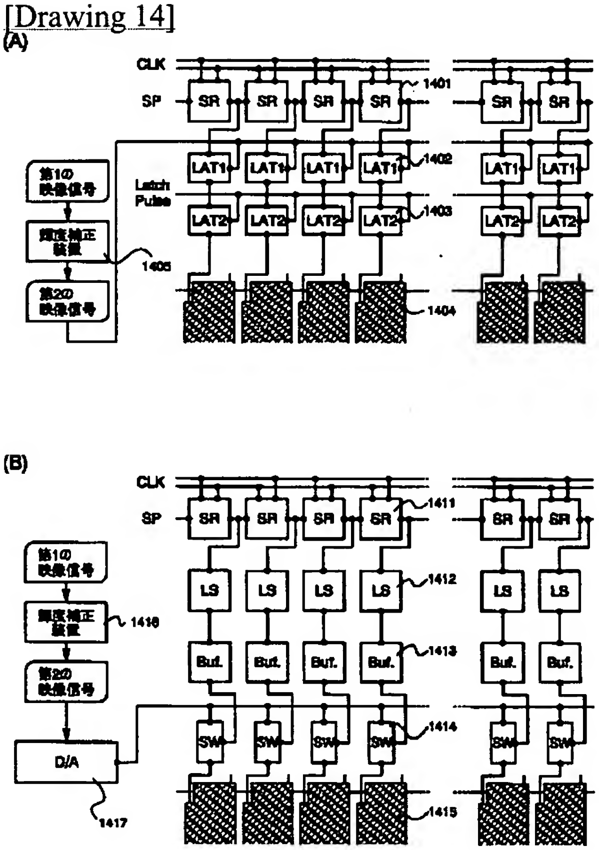
[Drawing 13]



[Drawing 18]

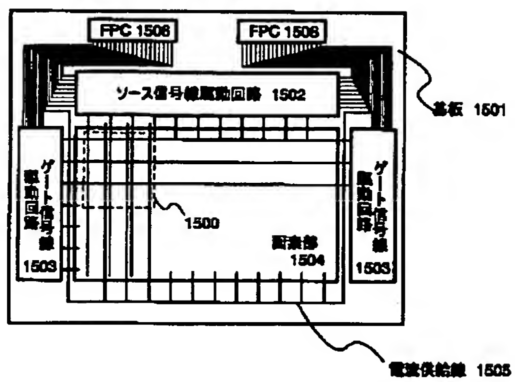


[Drawing 14]

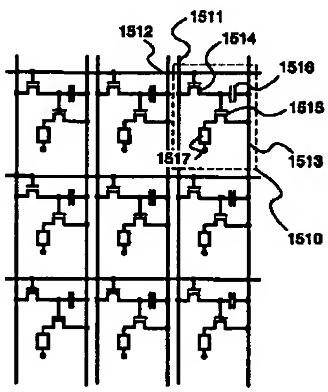


[Drawing 15]

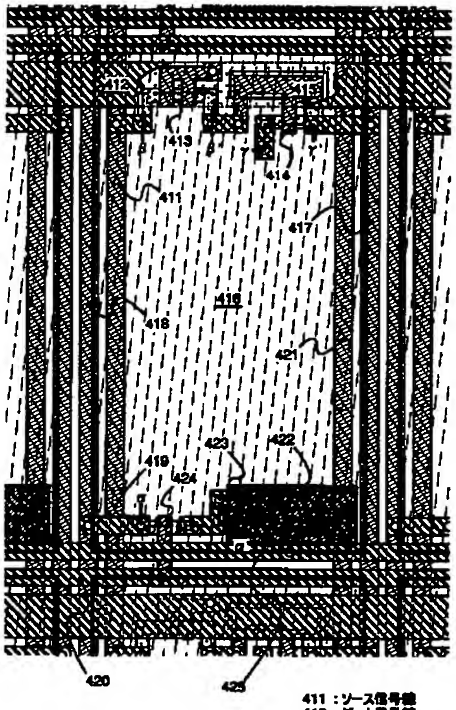
(A)



(B)



[Drawing 16]



411 : ソース信号線
412 : ゲート信号線
413 : スイッチング用TFT
414 : EL駆動用TFT
415 : 保持容量
416 : EL素子
417 : 電流供給線
418 : 信号出力線
419 : リセット信号線
420 : 走査線
421 : 基準電源線
422 : リセット用TFT
423 : バッファ用TFT
424 : 選択用TFT
425 : 光電変換素子

[Translation done.]